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COST ACCOUNTING

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THIRD EDITION

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ASIAN STUDENTS' EDITION

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To the Memory of
IVAN MARLOWE FARMER
who was engaged as a coauthor
at the time of his death

PREFACE

The publication of the third edition offers an opportunity to combine in the revision the suggestions of a large number of teachers and practitioners of cost accounting with the thirty-six years of teaching experience of the authors so as to provide an up-to-date text which surveys the field of cost accounting.

The revision attempts to meet the demand for a basic textbook with the primary emphasis on cost analysis and control and utilization of cost data by management in formulating business policies and a minimum of descriptive material dealing with cost accounting techniques and bookkeeping procedures.

The basic plan of the second edition has been followed, but a slightly different arrangement of chapters has been provided, the material in two chapters has been deleted, and three new chapters have been added. The chapters dealing with Cost Accounting for Financial Institutions—Banks and Cost Accounting for Governmental Units have been eliminated because they are considered to be too specialized for a survey text in cost accounting. The material dealing with Cost Accounting for Retail Establishments has been condensed and incorporated in Chap. XIX, Distribution Cost Accounting. The three new chapters, emphasizing the managerial approach, are Analysis, Investigation, and Disposition of Variances from Standards and Statements for Management; Cost Analysis for Management Decisions; and Cost and Income Charts. The chapter entitled Payroll Accounting has been completely rewritten in order to describe payroll procedures and to explain the latest payroll tax and withholding requirements of the Federal Insurance Contributions Act; the Federal and state unemployment acts; the Federal income tax; and the regulations governing the Federal Fair Labor Standards Act. Each chapter retained from the second edition has been revised, new material has been added, and emphasis has been changed from descriptive features of cost accounting to control aspects and utilization of cost data by management. Illustrative material and cases, presented in National Association of Cost Accountants bulletins, and recommendations of the American Institute of Accountants and the American Accounting Association regarding cost principles and terminology have been included.

Following the text material are 389 questions and 191 new problems, many of which are based upon case studies of actual business enterprises. Cost questions and problems appearing in recent Uniform Certified Public

Accountant Examinations are included for many chapters. The majority of the problems have been planned so as to eliminate as much of the detailed work as possible without sacrificing an understanding of the principles involved. There is an adequate supply of problems so that alternative assignments can be made for three or four semesters. Three practice sets are available: Job Order Cost Practice Set A; Process Cost Practice Set B; and Standard Cost Practice Set C.

The third edition can be used equally well in a one- or a two-semester course. It is recommended that instructors teaching a one-semester course cover Chaps. I to VII, IX to XIII, and XVI to XIX. Either the Job Order Cost Practice Set or the Process Cost Practice Set, or both, may be used to supplement the questions and problems, although there are sufficient problems of varying length and type to provide adequate practice material without the use of practice sets.

We are indebted to the instructors of cost accounting in many universities and colleges and to the Accounting Faculty of the University of Kansas for their valuable suggestions and comments. We are indebted to the National Association of Cost Accountants whose publications have offered so much inspiration and case-study material. Special mention should be made of the excellent assistance of Colleen Helmlinger in the preparation of the Solutions to Problems manual.

JOHN G. BLOCKER
W. KEITH WELTMER

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Part I

FUNDAMENTALS OF COST ACCOUNTING

CHAPTER I

OBJECTIVES OF COST ACCOUNTING

Functions of Cost Accounting. A major function of cost accounting is the determination and analysis of costs and income of a business enterprise so that comparisons by divisions and periods of time can be made in order to evaluate the operating efficiency of each division. Cost procedures have been developed to record costs and income by departments, processes, operations, lines of products, sales territories, sales orders, salesmen, and, in exceptional cases, by customers. Some forms of cost and income statistics can be obtained in all types of business enterprises including manufacturing, construction, mining, merchandising, railroads, public utilities, financial institutions, and nonprofit organizations such as municipalities, hospitals, and universities.

A second function of cost accounting is the accumulation and utilization of cost data for the purpose of controlling costs. The objective is to maintain costs at the lowest point consistent with the most efficient operating conditions. It requires the examination of each cost in the light of the service or benefit obtained so that the maximum utilization of each dollar will be obtained. It requires planning in the form of flexible budgets, and the best results are generally obtained from the use of standards as a means of determining what material, labor, and overhead costs *should be* for each department, job, group of workers, individual worker, and type of product.

A third function is the proper matching of costs with revenues. Since it is considered valuable to management to have monthly or quarterly financial statements, it is important that the cost and income data presented in the statements reflect the costs of production or service that are identified with the sales for the period, regardless of when expenditures represented by these costs of goods or services were incurred. Thus in manufacturing and production enterprises material, labor, and overhead costs are accumulated first as an asset termed Work in Process and subsequently as an asset Finished Goods, but they are not treated as an expense or cost-of-goods-sold element until the accounting period when the goods or services, represented by such expenditures, are actually sold. If the theory of matching costs with revenues is extended to include selling and administrative costs, individual expense items will be eliminated from the income statement, since all costs will be treated as finished goods inventory until such a time as they are charged against revenue in the period when the goods are sold. This subject is discussed more completely in Chap. II.

A fourth function of cost accounting comprises special cost studies and investigations which are invaluable to management in determining policies and formulating plans directed toward profitable operations. Such special studies include pricing of new products or services, elimination of seasonal conditions, expansion or contraction programs, replacement of machinery and equipment, wage-compensation plans, changes in methods of distributing products, and many other special problems peculiar to particular industries.

The techniques of cost accounting, which produce statistics of the internal operations of a business enterprise, are at best tools by which management may conduct a business toward profitable operations and by which creditors, stockholders, consumers, and government may evaluate the efficiency and success of the enterprise. Cost accounting has become a dynamic division of accounting with unlimited possibilities of growth and interpretation in the closely related field of management.

Financial Accounting the Forerunner of Cost Accounting. Accounting may be divided into two general types:

a. Financial or general accounting.
b. Cost accounting.

For centuries, in fact, from as early a date as 443 B.C. in Roman history, financial accounting was deemed to be adequate for managerial control in private, public, and corporate business. Financial accounting was the outgrowth of single-entry-bookkeeping. It was constructed and reconstructed, through the centuries of changing business methods, to present at regular intervals, usually yearly, information regarding the financial status of a business enterprise and to show in detail the nature of the changes that had taken place during the period. From day to day during each period, business transactions are analyzed and recorded in books or records of original entry. At frequent intervals during the period, or at the end of the period, transactions which have been properly classified and summarized are posted to a general ledger and to subsidiary ledgers or records. At the end of the accounting period, expense and income accounts are closed into a summary account termed Profit and Loss. The Profit and Loss account is closed into Surplus or Proprietorship accounts and a profit and loss statement is prepared to present in summary form the changes in net worth that have taken place during the period; the items affecting the change are classified as expenses and revenue. The profit or loss for the period is considered to be the most significant figure in the accounting reports. A balance sheet is prepared at the end of each accounting period to exhibit assets, liabilities, and ownership or net worth; the statement is a cross section of the financial status of the enterprise at the particular moment.

Limitations of Financial Accounting. In spite of new accounting devices, improved techniques, and elaborate subsidiary records, financial accounting is so limited and inadequate in regard to the information which can be supplied to management that, during the past 30 years, businessmen have been eager to adopt supplementary accounting methods known as cost accounting.

Financial accounting provides information concerning the business enterprise which permits management to control in a general way the major functions of a business: finance, administration, production, and distribution. However, details regarding the operating efficiency of these divisions are lacking. The following deficiencies in financial accounting have led to the development of cost accounting.

a. The classification of accounts does not give data regarding costs by departments, processes, products, and units in the manufacturing division; by units of product, lines, and sales territories in the selling or distribution division; and by departments, services, and functions in the administrative division.

b. Frequently materials and supplies are not properly controlled, and misappropriation, deterioration, obsolescence, and losses from scrap and defective parts result.

c. Wages and labor are not recorded by jobs, processes, departments, or services and are not interpreted in the light of cost factors. No company-wide system of incentives may be used to compensate laborers, clerks, salesmen, and executives for above-standard performance.

d. Expenses are not classified as to direct and indirect items and are not assigned to the product at each stage of production to show the controllable and uncontrollable items in overhead costs.

e. There is no well-developed system of standards to appraise the efficiency of the organization in the use of materials, incurrence of labor, and overhead costs by comparing the work of laborers, clerks, salesmen, and executives with what should have been accomplished in producing and selling a given number of products in an allotted period of time.

f. The accounting is historical, since the data are summarized at the end of the accounting period. There is no day-to-day cost information obtainable, and there may be no budgetary elements permitting the computation of predetermined costs.

g. Costs are not available as an aid in determining prices of products, services, production orders, or lines of products.

h. There is no complete analysis of losses due to idle plant and equipment showing cost variations between active and inactive periods and seasonal conditions in the industry.

i. In contemplated plans for expansion or contraction of plant and equipment, it is impossible to appraise and compare properly the profitableness of alternative methods, high cost of maintenance, and differences in efficiency between types of equipment.

j. Adequate information is not available for reports to outside agencies, such as banks, credit associations, Federal, state, and local governments, insurance companies, and trade associations. It is impossible to prepare detailed reports exhibiting complete cost data regarding operation of the enterprise for purposes of comparing such data with other periods of operation and with other concerns in the industry.

The deficiencies in financial accounting just outlined may be restated as advantages of cost accounting. The elaboration of the services performed by the cost accountant will be undertaken throughout the book, but it may be of value to summarize briefly in a general way the contributions which can be made by the cost accountant. Cost accounting is not worthy of recognition as a profession and as an integral part of good management unless its contributions are widely diffused to include management, employees, bankers and other creditors, consumers, and the public in general.

WHAT MANAGEMENT MAY EXPECT OF COST ACCOUNTING

In serving management, the cost accountant must develop practical cost procedures that produce statistics useful in controlling the operations of the business enterprise. An equally important task is the proper analyzing, interpretating, and reporting of the figures obtained by the cost techniques with accompanying recommendations as to future policies.

As a function of management, cost accounting provides for the proper classification and subdivision of costs; control of materials and supplies, wages, and overhead costs; establishment of standards for measuring efficiency; budgeting; accumulation of data as an aid to price determination; curtailment of losses due to seasonal conditions; and determination of expansion and contraction policies.

Classification and Subdivision of Costs. One of the most important contributions of cost accounting is that of detailed cost information for managerial control. In addition to a single profit or loss figure, as is supplied by financial accounting, the cost accountant classifies costs and income by every possible subdivision of the business.

There are numerous possibilities for cost control in the manufacturing division, depending upon the type of system. If the process or operation type of system is adopted, costs are accumulated by processes and by operations and are then transformed into unit costs, such as per ton, gallon, thousand feet, or machine. If a job order system is in use, costs are analyzed by departments or production centers and by production orders sent through production departments.

Cost accounting for sales distribution requires that costs be accumulated by sales service departments and sales branches or territories, by sales departments, lines or types of products, and in some cases by salesmen and customers' accounts.

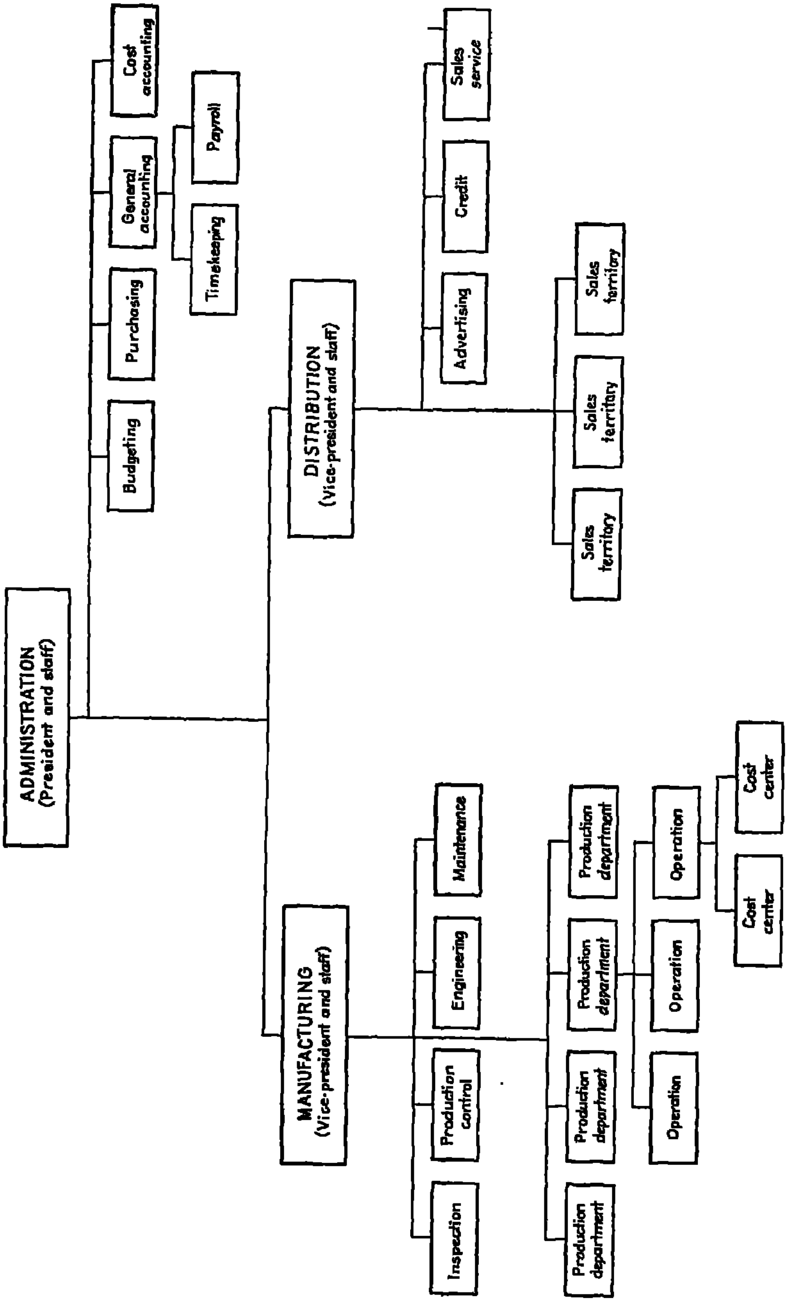
In administrative and financial divisions, cost accounting provides detailed costs required to maintain each division, department, and special service.

Exhibit 1 is an organization chart which shows the primary divisions and subdivisions of a manufacturing concern which produces and sells its own products. It may be used as a basis for the classification of costs.

Control of Materials and Supplies. Since in all types of cost accounting, materials and supplies must be accounted for in terms of departments, processes, and units of production or service, a system of receiving, handling, and issuing materials and supplies is an essential part of cost control. Business papers, such as requisitions for purchase, purchase orders, material received reports, testing reports, invoices and vouchers, are used to support the receipt of the material and the payment of the obligations incurred. The perpetual inventory method is used to control properly the material in stockrooms. Subsidiary stock ledgers are set up with an

EXHIBIT 1

AN ORGANIZATION CHART



account or card for each type of material, showing the date of the order, units and value of the goods received, quantity and value issued from stockrooms, and balance on hand. Materials are issued from stock only on requisition, and returns to stock are recorded on material returned reports. Material issued may be classified by departments, production orders, territories, or services. Yearly, or more frequently, physical inventories of material are taken, and adjustments are made where variances between actual and book figures occur.

In planning a system of cost accounting in any type of concern, the starting point is usually the establishment of a system of control over materials. As materials proceed through production departments, inefficiencies in their use resulting from excessive quantities, defective work, and scrap are revealed by production reports. Control of raw materials and of parts follows production until goods are completed, and a form of perpetual inventory control is then exercised over finished goods.

Control of Wages and Salaries. Cost accounting activities encourage accounting for labor by jobs and by operations. In many manufacturing concerns daily summary reports are prepared to show the number of hours and minutes worked and the wage rate for each worker per job or operation. Elaborate systems of incentives, such as piece-rates or bonus plans, are in use as a part of manufacturing cost accounting for that labor which can be identified with particular jobs or operations.

Salaried employees and laborers whose payroll time is in part or wholly of an indirect nature are accounted for on daily time reports which are summarized to provide weekly or semimonthly payrolls, classified by departments or services.

Cost accounting is a benefit to the employer by establishing standards to measure efficiency of labor, to assist in the assignment of work to employees best fitted for it, and to determine the unit cost of labor arising from each activity.

Overhead Costs. Costs are all very much alike to the general or financial accountant. He compares costs of one period with those of another, but he seldom classifies them as to controllable and uncontrollable items. The cost accountant first separates costs into direct and indirect items. Direct costs consist of material and labor that can be definitely identified with production, while indirect costs, generally termed "overhead," are items such as depreciation, clerical salaries, supplies, and taxes, none of which can be definitely assigned to a single product or production order. This division permits the costing of production units from day to day.

The further classification of overhead or indirect costs into controllable and uncontrollable items permits the cost accountant to concentrate his attention on those costs which can be reduced or eliminated. There is little the cost accountant can do to reduce taxes and insurance, but such variable items as clerical labor, idle time, supplies, power, and spoilage or waste in materials warrant his careful scrutiny.

Standards for Measuring Efficiency. The most important new development in cost accounting is the use of standards to assist management in the allocation of responsibility and authority, to aid in making estimates and plans for the future, and to develop bases of measurement with which to evaluate the efficiency of operations. Executive judgment is naturally difficult in the absence of standards of performance against which actual results may be measured. The setting of standards of performance requires preliminary investigation and research involving work of cost accountants, engineers, sales managers, and of various department heads. Past performance is examined, and time and motion studies are made to determine the best attainable standards of material, labor, and overhead as to both quantity and price, with no allowances for inefficiencies. As production progresses, actual performance is compared with predetermined standards to determine operating efficiency. Standards such as sales quotas, advertising appropriations, and travel allowances are set in advance of the accounting period in the sales or distribution division of business enterprises.

Budgeting. Originally, cost accountants followed the plan of financial accounting in presenting historical costs, *i.e.*, they accumulated costs at the end of the accounting periods, monthly, quarterly, or yearly. Such costs, at best, were valuable only as a guide to management since products were generally produced and sold and services were rendered before cost figures were available.

The use of budgets has revolutionized cost accounting and has made it *a preventive device to correct inefficiencies before they creep into business* operations or as they are recognized from day to day. A good budget system shows the executive what he may expect in sales over the next few months; it permits the formulation of a production quota including the kinds and quantities of material, the number and classes of workers, the amount of overhead, and the equipment requirements; and it indicates the financial requirements needed to complete the budget plans. The budget system is a coordinated plan of action for every executive, salesman, and foreman which, by means of the cost system, can be compared with actual results monthly or more frequently.

Cost Accounting an Aid in Price Determination. The general level of prices for products and services is determined by conditions of supply and demand in local, national, or international markets, but price lists of individual products or services must be prepared by executive decision after careful consideration of the cost of production and of competitive conditions. Cost conditions may prevent the profitable marketing of a product at existing prices, or it may be considered more profitable to set a price below prevailing market prices in order to obtain the resultant increase in volume of sales. The problem of properly regulating prices and output is dependent upon a knowledge of production, distribution, and administrative costs per unit of product or of service.

Since, in general, prices are determined by the forces of supply and demand and an entrepreneur can set his prices only to a limited extent, cost control is the only means by which a business may be insured against loss. If selling prices and costs can be predicted with reasonable certainty by budgetary methods, the businessman is in a position to increase or decrease his output, to change the character of his product, to lower prices, or to regulate cost conditions in such a way as to realize maximum net profits.

Curtailment of Losses Due to Seasonal Conditions. Seasonal variations in activities are responsible for higher costs and lower profits in many industries. It is a duty of the cost accountant to attempt to alleviate the situation by smoothing out the peaks and dips in production and sales activities. This can be accomplished indirectly by presenting to management figures showing costs and losses resulting from irregular employment of labor, machinery, and plant. Wastes in the use of materials, inefficiencies in employment of temporary labor, and losses caused by operating machinery and plant beyond normal capacity, all become apparent during periods of overcapacity production. Idle time of workers and machinery, costs of storing raw materials and finished products, unabsorbed overhead costs, and a general decay in the morale of personnel, all result from subnormal operations. These inefficiencies can be vividly exhibited in cost reports.

The cost accountant can contribute directly to the stability of the business enterprise by showing the value of lowering prices and of increasing volume during off seasons. It may appear profitable for many concerns to follow the example of the soap industry and to plan a daily schedule of production throughout the year, producing quantities in excess of sales during the late fall, winter, and spring months, when sales are comparatively low, and producing less than the sales volume during the warm months of the year when the volume of sales is at its peak. Large inventories may mean an increase in the cost of warehousing and a loss through inactive working capital, but it is more than compensated for through economical use of labor and of plant facilities. The use of budgetary control, combined with cost accounting, has done much to bring about stability in industrial activity with benefits accruing to stockholders, to employees, and to society in general.

Cost Accounting and Expansion Policies. Every business is constantly subject to changing internal cost conditions; some costs are increasing and others decreasing, even though production remains constant. Management also is puzzled by rapidly changing national and international conditions which, although external to the industry, have considerable effect on costs. In spite of these dynamic influences management must adopt policies to meet competition, develop new markets, contract or expand sales of particular products, buy new machinery, and build new plants.

The cost accountant is capable of making special investigations and of preparing reports to keep management advised of the relative advantages and profitableness of one policy as compared with another. Past costs and estimated future costs can be used to determine whether it is economical and advisable to pioneer new markets or to meet competition with new products or methods in established territories. A good cost system should reveal the cost of operating equipment, indicate differences in the operating efficiency of various machines, and show to what extent new equipment would result in more economical operation.

Value of Cost Accounting to Management. Cost accounting is so closely allied to management that it is difficult to indicate where the work of the cost accountant ends and managerial control begins. In general, it may be said that *cost accounting is to serve management in the* execution of policies and in the comparison of actual and estimated results in order that the value of each policy may be appraised and changed to meet future conditions.

WHAT EMPLOYEES MAY EXPECT OF COST ACCOUNTING

It may appear to the casual observer that the sole objective of cost accounting in its relation to employees is to devise divisions of labor, sponsor elaborate systems of incentives and piece-rates, and establish standards of performance in order to obtain the last drop of energy from the worker each day and so increase company profits for the owners. Cost accounting as a function of management would be of limited value if its aims and objectives were not also of direct benefit to employees.

The personnel of many business enterprises have benefited by the establishment of incentives in the form of piece-rates and bonus plans which may be used to compensate all classes of workers, including supervisors, clerks, department heads, and major executives. The policy of paying workers in accordance with their production, rather than on a per diem or weekly basis, is preferred by efficient and industrious workers because it increases the "take home" pay. Piece-rate and bonus plans have been subjected to criticism because in some plants the standards have been changed when it appeared that workers were constantly producing above standard and were earning large wages. This unfair personnel policy has caused workers to be wary of such compensation plans. It is a better plan to have the standards of labor performance determined by a committee, comprising one or more representatives of the plant workers, based upon scientific time and motion study with the guarantee that the standards of performance will be maintained until there has been a change in the nature of the job or the material used.

Personnel directors and plant supervisors are depending more and more on data supplied by cost accountants in their rating of employees and in their delegation of responsibility for important tasks.

Workers have a vital interest in their employer's enterprise and in the industry in which they are employed because over a period of years they will benefit indirectly through the increase in consumers' goods but more directly through continuous employment and larger compensation. Cost accounting is an aid in bringing about these objectives.

WHAT CREDITORS MAY EXPECT OF COST ACCOUNTING

There are many creditors who have a "stake" in the success of business enterprises. These include banks and various Federal lending agencies, manufacturers and wholesalers who grant credit terms, bondholders and note holders who have advanced their private capital, and state and Federal taxing units whose revenues are dependent upon tax and license collections. To an increasing extent, these individuals and agencies are basing their judgment of the profitableness and future prospects of an enterprise upon the studies and reports submitted by cost accountants.

It has become a policy of many banking institutions that no loans will be made to industrial firms unless such concerns have complete cost accounting systems which produce cost reports showing satisfactory trends. In the case of new enterprises the loan committees of these banking institutions require special cost investigations, budgets, and estimated profit and loss statements before they will consider making a loan.

It should be the policy of investors to study the cost statistics of the firms that they are considering as investment possibilities because the cost figures generally make possible the determination of future trends of the company, and in many cases, of the industry.

Federal and state tax returns and reports to governmental agencies, such as the Federal Trade Commission, are more easily prepared and more readily accepted when cost data are available. Detailed payroll and personnel records facilitate the preparation of state and Federal social security reports. It is explained in Chap. XIX that it is essential for manufacturers and wholesalers whose distribution methods are subject to the Robinson-Patman Act, an antitrust act enacted in 1936, to have a distribution cost accounting system to substantiate the price differentials that may be made to different types of customers.

WHAT THE PUBLIC MAY EXPECT OF COST ACCOUNTING

Although the cost accountant's responsibilities are directly to management, to employees, and to the creditors of a particular firm, the effects of his accomplishments are of value indirectly to the public as consumers and to the employees of subsidiary and related industries.

Importance of Low Costs and Efficient Operations. Many concerns are operated inefficiently owing to avoidable losses such as improper planning and scheduling, waste and spoilage of materials, idle time and inadequate training of employees, lack of harmony between labor and management, and improper internal control of overhead costs. The resultant high costs, which may not only plague a particular concern but may be typical in an industry, have a direct bearing on the prices paid by consumers and affect the general standard of living. Thus, when the cost accountant aids in reducing and controlling costs, he is performing a service to his neighbors and in the interest of our national economy.

Importance of Stability within a Concern and Industry. Price cutting below cost in one or more firms in an industry has led to disruption and instability in many industries. Usually the "price cutter" does not know his costs and is not able to operate without the benefit of a margin of profit for any length of time, but his failure may plague the industry for many months. These failures leave a wake of losses to displaced employees, to creditors, to stockholders, to related enterprises, and to governmental agencies as tax collectors. Promotional efforts are being made by the Department of Manufacture of the U.S. Chamber of Commerce, the National Association of Manufacturers, the National Association of Cost Accountants, and leaders of each industry to increase the membership in trade associations. The association and cooperation of firms in each industry stimulate the use of standardized cost terminology, procedures, and reports so that cost data of individual companies can be compared accurately with others in the industry.

CHAPTER II

COST PRINCIPLE, TERMINOLOGY, CLASSIFICATION, AND VOUCHERING

Meaning of the Cost Principle. Historically it was recognized by accountants and businessmen that the balance sheet was the most important financial statement, and efforts were made to obtain as accurately as possible the assets, liabilities, and capital accounts on a particular day even though such valuations resulted in inaccurate profit and loss figures for the accounting period. Accounting principles and practices have recently been reexamined, and many accountants have given emphasis to the profit and loss or income statement over the balance sheet through the adoption of the "cost principle" and the acceptance of the concept of matching costs and revenues in terms of accounting periods. Thus accounting, particularly cost accounting, has the objective of charging the revenues of each accounting period with the costs associated with the products or services represented by such revenues. For example, if a manufacturing concern is processing new products during January and no units are sold during the period, there have been no expense elements for the month. Expenditures or charges for material, labor, and overhead are treated as assets, first in the form of work in process inventory and subsequently in the form of finished goods inventory. It is not until the finished goods are sold that the accumulated costs are characterized as expense elements, termed Cost of Goods Sold, and are matched with the revenue identified with the sale of the products.

Matching Costs and Revenues. The objectives of the cost accountant in the process of accumulating costs and the matching of costs and revenues may be illustrated as Exhibit 2. General Administrative Costs and Distribution Costs are shown as "expense" elements, which are transferred to Profit and Loss indirectly through the Cost of Goods Sold account. If the process of matching costs and revenues for each accounting period is followed consistently, those portions of the General Administrative and Distribution Costs which are identifiable with Work in Process, Finished Goods, or whose charges represent future services, such as the cost of an advertising campaign for a new product, should be treated as assets either as prepaid items or additions to Finished Goods inventories until the accounting period when the goods are sold, at which time the "matching" process of expense and revenue elements should take place.

Product and Period Costs. Costs included in inventory values are described as "product costs." As inventory is sold, product costs are transferred from the inventory accounts to the Cost of Goods Sold account, thus becoming part of the "period costs" at the time revenue is realized. Period costs are costs that are charged against the revenue of a period of time. Differences of opinion exist regarding whether certain costs should be considered as product or period costs. Strict adherents to the matching concept consider that all costs other than nonoperating items should be treated as product costs. A larger group of accountants are of the opinion that the matching process is not violated by classifying the following items as period costs:

a. General Administrative and Distribution Costs. In accordance with conventional accounting practice, these costs are treated as operating expenses in the profit and loss statement as period costs for the following reasons: (1) it is difficult to select equitable bases to allocate these costs to products; (2) the majority of these expenses are constantly recurring regardless of the volume of production; and (3) many of these costs are incurred to obtain future sales.

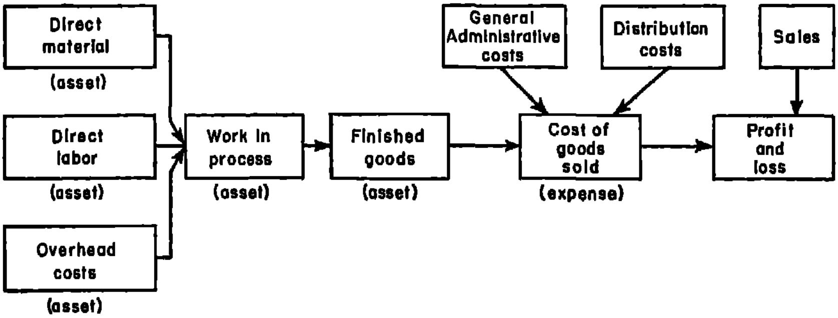


Exhibit 2. Cost formula for a manufacturing concern.

b. Fixed Costs. All costs that are incurred regardless of the volume of production and sales are classified as "fixed costs." They are a function of time and may be treated as expenses of the period in which they are incurred. These items continue to exist in approximately the same amount when sales and production are high or low and during temporary production stoppages. When fixed costs are treated as period costs rather than product costs, inventory values are smaller and operating expenses are higher. If fixed costs are included in the cost of the product, it is possible that inventory values may exceed the market price of the product. For example, if an automobile parts manufacturer has a very low production during a labor strike, the absorption of the fixed costs of the company by a small number of units produced may increase the unit cost to a point where it exceeds the market price.

It is the opinion of the authors that in order to obtain accurate unit costs and inventory values and the proper matching of costs and revenues, all costs, both fixed and variable, which can be reasonably and equitably identified with production and associated activities, should be treated as product costs.

COST TERMINOLOGY

Cost accounting and financial accounting have, in general, a common terminology. There are, however, a number of terms, accounts, and records which are peculiar to cost accounting. It is in its infancy as compared with financial accounting and does not have a strictly uniform or universally accepted use of terms or classification of accounts. Cost accountants, public accountants, and executives are endeavoring, through trade associations, associations of manufacturers, the American Accounting Association, the American Institute of Accountants, the U.S. Chamber of Commerce, the National Industrial Conference Board, and the National Association of Cost Accountants, to limit and standardize the terminology of cost accounting. Although progress is being made in this direction, refinement in the use of terms still is in process; consequently the student must be acquainted with varying expressions and meanings, many of which are the result of common usage in factory and accounting offices.

Although business concerns differ in organization when considered from the functional viewpoint, in general the following divisions may be noted:

a. Production (processing or putting product in salable state).
b. Distribution (sales of products or services).
c. Administration and financing.

Within each division the cost of an article, service, or department is the sum of the three elements entering into it: direct material costs, direct labor costs, and indirect or overhead costs.

A chart of a classification of costs for a manufacturing concern is presented as Exhibit 3.

Direct and Indirect Costs. In the case of both material and labor, the cost accountant is faced with the practical problem of determining direct and indirect costs. If records could be maintained in infinite detail, costs that are usually treated as indirect charges could be identified sufficiently to warrant consideration as direct charges. For practical purposes, however, only material and labor which are easily and economically traceable to a product, service, or job are considered to be direct costs. As costs are refined and cost systems accumulate more detailed information, many items of material and labor now classified as indirect costs will be presented as direct elements.

Direct Material Costs. Direct materials are those materials and supplies which can be identified with the manufacture of a product or of a group of products in a manufacturing concern. Materials may be considered a direct charge at one time, but an indirect or overhead charge on other occasions. Thus nails used in a box factory would be charged to

EXHIBIT 3

CHART OF COSTS FOR A MANUFACTURING CONCERN

- Total cost to make and sell
  - *Manufacturing costs*
    - *Direct material*
      - Raw materials
      - Semifinished parts
      - Finished parts for assembly
    - *Direct labor*
      - Factory payroll
    - *Factory overhead costs*
      - Service departments
      - Production departments
        - Production orders
      - Indirect materials
      - Indirect labor
      - Rent
      - Payroll taxes
      - Property taxes
      - Depreciation of machinery
      - Repairs
      - Insurance
  - *Distribution costs*
    - *Delivery costs*
      - Freight-out
      - Depreciation of delivery equipment
      - Gasoline and oil
      - Auto repairs
      - Salaries, deliverymen
      - Warehouse costs
      - Insurance
    - *Selling costs*
      - Advertising
      - Salesmen's salaries
      - Samples
      - Travel
      - Depreciation of sales equipment
      - Rent of branches
      - Telephone and telegraph
      - Supplies
      - Property taxes
      - Payroll taxes
      - Sales service departments
        - Advertising
        - Sales promotion
        - Sales accounting
      - Sales territories
        - Salesmen
        - Products
        - Customers' accounts
  - *Administrative costs*
    - Office salaries
    - Executive salaries
    - Supplies
    - Rent
    - Depreciation of equipment
    - Telephone and telegraph
    - Travel
    - Property taxes
    - Payroll taxes

Work in Process as a direct cost when used in production, but would be charged to Overhead Cost when used to repair the factory building.

The test for direct materials is that they must be accountable and traceable as they enter into the product, service, or job. On this basis they are distinguished from indirect materials such as stationery, oil, and gasoline which are used for general administrative and manufacturing purposes and from repair parts and replacements which are required for equipment and buildings.

Direct Labor Costs. Direct labor consists of the labor of employees which can be identified, as in the case of direct materials, with the manufacture of a product or group of products in a manufacturing concern. Direct labor comprises workers such as drill-press operators, as distinguished from indirect workers such as clerks, foremen, department heads, timekeepers, and janitors. A worker may be performing direct labor for a certain number of hours but be an indirect worker for the balance of the day. For example, enterprises frequently have general utility men who may be working on an assembly line or operating a machine as direct laborers for 4 or 5 hr. but later in the day may aid in repairing machinery or in doing clerical work as indirect workers.

Prime Costs. The term "prime cost" is used commonly to denote the sum of direct material and direct labor costs in the production of a product. It is limited in its use to the manufacturing division of a business concern.

Overhead Costs. Overhead is the term generally applied to those charges which cannot be traced directly to a particular unit of output. Certain items of overhead may be determined directly for a machine, an operation, or a department but will be indirect as to the unit of output. An overhead item, such as electric power, may be identified by meter with a machine or department which produces a number of units of output.

Other terms frequently used for and interchanged with overhead are "indirect costs," "burden," "supplementary costs," and "manufacturing expenses."

Conversion Costs. This term is used commonly to denote the sum of direct labor and overhead costs in the production of a product. It is the total cost of "converting" a material from one stage of production to the next succeeding stage of production.

Distribution Costs. Distribution costs include all costs incurred from the time the product has been put in a salable state until it is converted into cash. Thus they involve the functions of selling, storage, transportation, credit, and collection. The major items of cost include advertising, sales salaries and commissions, packing, storage, transportation, credit, collection, and sales administrative cost.

Administrative Costs. Administrative costs include costs of planning and of controlling the general policies and operations of a business enterprise. Usually all costs which cannot be assigned either to the production or sales division are considered as administrative costs. Typical are such items as fees of the board of directors, the president's salary, the rent for general offices, and costs of the general accounting department.

Joint Costs. Joint costs arise when two or more products are processed at the same time, or in a single operation, or from a common material. A problem is created as to the proper distribution of material, labor, and overhead costs among the various products. When three styles of automobiles are completed on the same assembly line, production costs must be allocated to the three lines. If two or more products, such as cotton seed and cotton fiber, are produced from the same raw materials, joint costs are incurred up to the point of separation. Likewise, when a number of different products are purchased from the same supplier and are received in the same freight shipment, there arises the problem of apportioning the proper amount of transportation, receiving, and purchasing costs among the different products received.

Although various methods are used to apportion joint costs among departments, services, and products, there are no scientific bases for such allocations. However, valuable cost information can be obtained if bases are selected that are reasonable and equitable.

Distribution Bases for Cost Allocation. An important feature of all cost systems is the distribution of indirect or overhead costs to units, production orders, processes, departments, and territories in proportion to the amount of service rendered. Thus rent can be distributed to departments on the basis of floor space; repair department cost can be allocated to departments on the basis of the hours of service given to each department; and general advertising cost can be apportioned to sales departments or territories on the basis of the net sales of each unit. Production department overhead costs can be distributed to production orders on the basis of direct labor hours, direct labor cost, or machine-hours. Distribution bases can be computed at the end of each accounting period or can be predetermined as a part of a system of budgetary control and standard costs.

Actual, Estimated, Normal, and Standard Costs. The terms "actual," "estimated," "normal," and "standard" costs are frequently confused and incorrectly used. Actual costs consist of items incurred in the production, distribution, and administration of a business as shown by material requisitions, payrolls, and cost vouchers. Actual costs are accumulated daily and are summarized at the end of each accounting period.

Estimated costs are costs predetermined at the beginning of an accounting period in an attempt to forecast actual costs. The estimates are used in preparing price lists and contract bids. They are constantly revised as variances occur between estimated and actual operations.

Normal cost is an average of actual costs of production, sales, or service rendered during an operating cycle. Normal cost is computed for the budget period, usually a year, and is an average of monthly cost conditions at practical operating capacity, which is the utilization of production facilities for regular operating time with reasonable allowance for breakdowns, repairs, and inefficiencies.

Standard costs represent the best estimate that can be made of what costs *should* be for material, labor, and overhead after eliminating inefficiencies and waste. Standard costs are subject to revision only when there has been a change in the price level of materials and labor, or when there has been an alteration in factory methods or in the use of machinery. Standard costs represent management's best measure of efficient plant operation.

Departmentalization. One of the most important steps in the development of cost control is the proper division of the concern into departments. The term "department" has a distinctive meaning in cost accounting as compared with administrative concepts of the word. From an administrative point of view a department is a division of the business which permits the proper executive control of a specified number of men, of a continuous manufacturing process, or of a type of activity. In many cases the physical arrangement of a building or machinery is the basis for departmentalization. A department, as a cost accounting concept, is a division of a business enterprise in which a similar group of products are located, services are dispensed, similar machines are operated, or like kinds of work are performed. The important consideration, from a cost point of view, is the separation of the concern into units or divisions in which similar cost conditions for material, labor, and overhead exist.

Both production departments and service departments are used as costing units in manufacturing concerns. Production departments are centers which contain a battery of the same or similar machines, a group of workmen performing the same operation or assembly; or they are divisions having similar material, labor, and overhead cost conditions. Service departments contain indirect workers and machines performing similar service in facilitating production and management activities, such as the superintendent's office, the repair department, and the janitor or building service department.

The division of any business into departments must be accompanied by the proper delegation of authority and responsibility, each department being under the supervision of a department head or foreman.

COST CLASSIFICATION

Meaning of Classification of Accounts. An important feature in the installation of any accounting system is the proper classification of accounts. By classification is meant a convenient arrangement of accounts properly related as to function with an established relationship between general ledger accounts and subsidiary records. In financial accounting systems a customary arrangement of accounts in a ledger is in accordance with the plan of compiling the balance sheet and the profit and loss statement for a particular concern. Thus, it may be convenient to show Cash on Hand as the initial account, followed by such asset accounts as Cash in Banks, Accounts Receivable, and Notes Receivable until the asset list is exhausted. Liability, capital, and surplus accounts follow in order, and profit and loss accounts beginning with Sales are scheduled in succession.

With the introduction of cost records, supplemental to financial accounts, the problem of classification becomes slightly more complex. The accounts composing the profit and loss elements are augmented to include general ledger control accounts for each type of cost and in some cases for each service department, process, production department, and sales territory. In addition a number of subsidiary ledgers or records are necessary to record properly detailed cost information.

General Use of Controlling Accounts. Business transactions are numerous and varied in large business enterprises and warrant the use of many accountants and clerks in analyzing and recording transactions and in preparing reports. The establishment of a cost system increases materially the number of accounting records and the amount of analytical work. Obviously, with the growth of any business, it is an impossibility to record all transactions in accounts in the general ledger. The solution to the problem is the summarization of accounting information in controlling accounts in the general ledger and the recording of detailed cost data in subsidiary ledgers or records. Controlling accounts are ably defined and explained in connection with accounts receivable and accounts payable in elementary accounting texts; hence a detailed discussion is unnecessary.

The general ledger, from which are prepared the profit and loss statement and the balance sheet, is used to summarize classes of transactions in controlling accounts. Supporting each general ledger controlling account are one or more subsidiary ledgers or records in which business transactions are recorded in detail as they occur. With a few exceptions all accounts exhibited in the financial statements prepared for large concerns are controlling accounts.

Plan for Operating Controlling Accounts. The cost accountant is confronted frequently with the problem of advising management as to what cost controlling accounts should be shown in the general ledger, what data should be detailed in subsidiary records, and how the plan of using controlling accounts operates. A few general principles of controlling account–subsidiary relationships as found in cost accounting are suggested:

a. It is usually advisable to use a controlling account when detailed information can be compiled in records supplementary to the general ledger. For example, overhead costs may be analyzed in work sheets which may serve as subsidiary records for the Factory Overhead Control account.

b. A controlling account with supporting subsidiary records is advantageous when the accounting system is decentralized, *i.e.*, when detailed accounting is done in factory offices or branches apart from the general accounting office.

c. Subsidiary cost records may be in a variety of forms: bound or loose-leaf ledger accounts, card files, columnar analysis sheets, and such business papers as time tickets, payroll sheets, production orders, and expense vouchers.

d. The plan of operation is to have an account in the general ledger designated as a controlling account for a group of accounts; subsidiary record forms are devised; daily transactions are analyzed and posted to subsidiary records either from detailed entries in journals or, more frequently, directly from original business papers such as invoices, payrolls, time tickets, and vouchers; postings of totals of the transactions of the period are made weekly or less frequently to the controlling account in the general ledger from journals or from summary statements of transactions; the balance of the controlling account is proved monthly or more frequently with the sum of the balances of the subsidiary records which it controls.

Advantages of Controlling Accounts. The elimination of detailed accounts from the general ledger through the substitution of controlling accounts and subsidiary records has many advantages:

a. Controlling accounts are invaluable to management in policy formulation because they summarize masses of detailed information contained in subsidiary records.

b. Controlling accounts make possible a division of labor among clerks and accountants and a greater degree of specialization in work performed.

c. A system of internal checks exists through the use of controlling accounts because the work of one individual is checked against the work of others. This is an important factor in assuring accuracy, maintaining honesty, and detecting errors.

d. The use of controlling accounts permits the prompt preparation of financial statements at the end of each accounting period without waiting for all work to be done in balancing individual subsidiary ledgers.

e. Controlling accounts permit the general ledger to remain under executive control, and, since the accounting system is decentralized through the use of subsidiary records, costs and the financial position of the concern may be treated confidentially.

Important Cost Controlling Accounts. Cost controlling accounts and supporting subsidiary records vary with the type of business enterprise and with the size of the concern. No attempt is made in the present chapter to describe the controlling account-subsidiary record relationships. The controlling accounts that generally are used in cost systems, with special adaptations to fit requirements, are as follows:

Materials or Stores Control
Payrolls or Salaries Control
Overhead Control
Plant and Equipment Control

Other cost controlling accounts which are used frequently in addition to the above accounts are as follows:

Manufacturing divisions: Work in Process, Finished Goods, Service Departments, Production Departments, and Applied Factory Overhead.
Distribution or selling division: Sales Service Departments, and Sales Territories.

The subsidiary ledger supporting Overhead usually consists of a series of analysis sheets or columnar ledger forms commonly termed "standing orders." The title standing orders is employed because each analysis sheet or account has a name and a code symbol, such as Depreciation—Machinery, 1050, which remains unchanged until a new classification of accounts is prepared. This group of unchanging records may be contrasted with production orders, which exist as active subsidiary records only until the production of a particular order is completed. The term standing orders is used in this text to refer to the subsidiary records for overhead controlling accounts.

Selection of Account Titles. An essential part of the classification process lies in the selection of the most suitable account title for each account. The majority of account titles in financial accounting have become uniform through usage, but cost accounts are not so well standardized and identical information may have a variety of titles even in business concerns in the same industry. New types of transactions or changes in business methods frequently necessitate additional accounts or changes in the usage of accounts, either of which may lead to temporary confusion among the office personnel. Therefore a carefully designed and tested classification of accounts, which will require a minimum of changes, should be one of the first steps in the installation of an accounting system, especially of a cost system.

It has become the practice in many concerns to incorporate the classification of accounts in an accounting manual, which contains a complete description of each account in the classification and indicates its purpose, use, and the debits and credits to be made to it. Generally, subsidiary ledgers and other records which support general ledger accounts are described and their relationship to each account is explained. Standard forms of the profit and loss statement, balance sheet, and supporting schedules are exhibited.

Classification by Symbols or Code Numbers. Lengthy account titles generally have been replaced in accounting records by the use of code symbols or numbers. The substitution is made for two reasons. If a code method is not used, the title of an account may have to be written many times before a single transaction is completed. For example, in the handling of material, the account titles may have to be written on such business records as the purchase requisition, the purchase order, the material received report, the voucher, the stores requisition, and the material returned report. Instead of writing an account title which may be misspelled or improperly classified because of its technical nature or of carelessness, it is more convenient to use a code system. A second reason is secrecy. Management frequently considers it a poor policy to permit the general office employees to know the nature of purchase, labor, and expense transactions which occur from day to day and which are summarized in the general and subsidiary ledgers. A transaction may be analyzed and coded by the comptroller or accountant when a code system is in force, while the posting and other clerical work may be done entirely in terms of symbols or numbers without clerks realizing the exact nature of the transaction.

When a code system is used, the classification of accounts exhibits for each account the title and code symbol or number assigned to it. Usually the comptroller retains a complete classification schedule and supplies each department head and division accountant with the accounts and code which relate to his particular work. In preparing a classification of accounts, it is customary to provide a chart of accounts which is composed of a list of the account titles and numbers which are to be used. The chart should contain the title and number or symbol assigned to each account; it should present an orderly arrangement of accounts which will be followed in the ledger and in preparing financial and cost statements; and it should be supplemented by a manual of instructions dealing with the proper use of accounts and records. The manual of instructions is an important part of an accounting system, since it contains a detailed description of the general ledger accounts and the supporting subsidiary records. Frequently important types of transactions are illustrated with the proper form of debit and credit entries made to each account.

The most commonly used plans of coding accounts are as follows:

a. The numerical system.
b. The decimal system.
c. The mnemonic system.
d. The combination letter and number system.

Numerical System. The use of numbers to represent general ledger accounts and subsidiary records is the simplest plan of symbolizing. One plan is to assign a number to each account, with some numbers omitted to provide for additional accounts and records. The method may be illustrated as follows:

Current assets:
    1. Petty Cash
    2. Cash in Banks
    3. Accounts Receivable
    4. Notes Receivable
    5. Raw Material Inventories
        6. Gasoline
        7. Oil
        8. Castings
            Etc.
    25. Finished Goods Inventories
        26. Product A
        27. Product B
            Etc.
    50. Investments
    51. Prepaid Insurance
        Etc.
Fixed assets:
    75. Land
    76. Buildings
    77. Accumulated Depreciation of Buildings
    78. Machinery
        79. Lathes
        80. Drills
            Etc.
    100. Trucking Equipment

The use of a straight numbering system has the advantage of simplicity, but, unless the proper quantity of numbers is omitted for each group of accounts, it is difficult to provide expansion and flexibility.

A slightly different plan is to assign a block of numbers to each major class of assets, liabilities, net worth accounts, expenses, and income accounts. The method may comprise the assignment of numbers 1 to 100 to current assets, 101 to 200 to fixed asset accounts and records, 201 to 225 to intangible assets, 226 to 300 to liability accounts, 301 to 350 to net worth accounts, 351 to 500 to expense accounts and supporting records, and 501 to 550 to income accounts.

A third plan is to separate controlling accounts and subsidiary records by means of dashes between numbers. For example, the Factory Overhead Control account may be assigned the number 100 and a dash used to separate detailed subsidiary ledger cost accounts, allotted numbers from 1 to 50. If the Repairs account, subsidiary to the Factory Overhead Control account, is assigned the number 12, a charge to the control and subsidiary would be indicated as 100–12.

Decimal System. The decimal system of classification is based upon 10 units of decimal numbers, ranging from 0 to 10. Numbers from 1 to 9 are assigned to general ledger accounts, while subsidiary accounts and records are designated by the addition of a digit at the right. The method is illustrated as follows:

50. Selling Costs:
    50.1 Salesmen's Salaries
    50.2 Commissions
    50.3 Advertising
    50.4 Printing
    Etc.
51. Administrative Costs:
    51.1 Executive Salaries
    51.2 Traveling Expenses
    51.3 Clerical Salaries
    51.4 Telephone and Telegraph
    Etc.
55. Factory Overhead Costs:
    55.1 Rent
    55.2 Taxes
    55.3 Depreciation
        55.31 Depreciation of Lathes
        55.32 Depreciation of Presses
        55.33 Depreciation of Boiler

The decimal method has the advantage of flexibility and of unlimited expansion. It is subject to criticism because it is complicated and the decimal points are easily misplaced or omitted, with the result that frequently charges and credits may be made to improper accounts and records. A variation of the decimal system is used frequently. The plan of using series of digits from 1 to 9 is followed, but decimal points are omitted.

Mnemonic System. This system employs key letters or symbols in coding accounts for the purpose of suggesting the nature of each account and record, thus aiding the memory of accountants and clerks who analyze and record transactions. The letter A may be used to represent asset accounts, L to signify liability accounts. Cash may be symbolized as C, material as M, with a type of material such as brass fittings as BF. Thus the purchase of brass fittings to be considered as an asset and charged to Materials account may be coded A-M-BF. The letters FO may be representative of the Factory Overhead Control account, C may symbolize the Cutting Department, and R suggest Repair cost. Thus a transaction involving a repair cost chargeable to the general ledger account, Factory Overhead Control, and to the subsidiary account, Cutting Department, may be coded as FO-C-R.

A mnemonic system, which attempts to assign suggestive letters or combinations of letters to all accounts and records, is not readily adaptable to concerns with numerous accounts and records because it is difficult to select suitable letters. The method is used most effectively when combined with a number system.

Combination Letter and Number System. An effective plan of coding can be developed by means of combining the letter and number systems. Letters can be used to suggest controlling accounts, plants, branches, and divisions, and blocks of numbers can be assigned to subsidiary accounts and records. The schedule shown in Exhibit 4, suggests a possible arrangement of letters and numbers.

Exhibit 4

General ledger accounts	Code	Stockroom or department	Code	Subsidiary record classification	Code
Materials Control.	M	Raw-material stockrooms	1–10	Raw-materials stock accounts	500 -1000
Supplies Control...	S	Supplies stockrooms	11–12	Supplies stock accounts	1001–2000
Payroll Control....	P	Production departments	15–35	Direct labor operations (cutting, grinding, etc.)	2001–2200
Factory Overhead Control	FO	Service departments	36–50	Indirect labor operations (sweeping floors in machine shop, etc.)	2201–2500
				Overhead (taxes, depreciation, power, repairs, etc.)	2501–2550

The classification code illustrated above is a combination of letters and numbers for four important controlling accounts and their subsidiary records in a manufacturing concern. If a raw material, ¼-in. copper wire, is purchased and assignable to the Copper Wire Stock account in stockroom 2, the code is M-2-501. The payment of a repair bill for the trucking department, assigned to service department 37, is coded FO-37-2504.

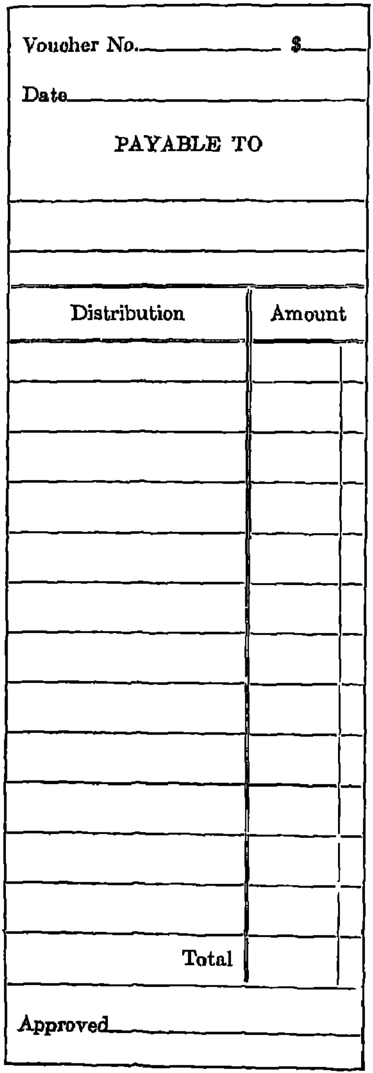
THE VOUCHER SYSTEM

In business concerns having transactions dealing with purchases of materials, supplies, and various costs such as payrolls, manufacturing, selling, and administration costs, the responsibility for disbursing funds and for incurring obligations should be determined, and a system of internal check should be in operation. The most effective system of control yet devised is the voucher system. It is universally in use in governmental and institutional units and is favored by accounting practitioners for all types of business concerns large enough to have a division of labor in the handling of funds and accounting records.

The voucher system involves the use of a series of checks and balances. When contracts and purchase orders are being prepared and large sums are disbursed daily, the checking and authorization of such business transactions by a number of clerks and officials are essential to good management. The voucher system is a method of handling, recording, and paying obligations through the use of vouchers which must be approved formally by the proper officials. The voucher system is an expansion of the purchase and cash disbursement journal methods of recording obligations and disbursements. The purchase journal is enlarged and renovated into the voucher register, which is designed to record all charges to purchases and cost accounts, while a cash disbursement record known as the "check register" is used in connection with the voucher register for the purpose of recording all disbursements.

A distinctive feature of the voucher system is the exacting requirement that all disbursements must be made by checks properly supported by approved vouchers. If small cash payments are necessary from time to time, a petty cash system can be operated to cover cash purchases of either commodities or services.

Voucher Forms. The heart of the voucher system is the voucher. Vouchers are business papers which contain the salient facts of business transactions and which authorize payment for an expenditure. Vouchers are not uniform and differ in design in accordance with the type of concern and the form of voucher register used. The voucher may be prepared to include a complete list of the items purchased or service rendered, but, more frequently, in order to avoid listing pages of items as shown on invoices, reference is made to the invoices and to other business papers, and only a brief résumé of the nature of the obligation is given. Terms and purchase discount may be recorded on the voucher when it is prepared, if the policy of the company is to take advantage of all discounts offered. A distribution of Accounts to Be Charged section is included on either the front or reverse side of the voucher; generally at the bottom of the form is the Approval section, with space for the signature of clerks and executives who have checked the mathematics and the propriety of the obligation.



Voucher No.________ $______

Date________

PAYABLE TO

Distribution	Amount
Total	

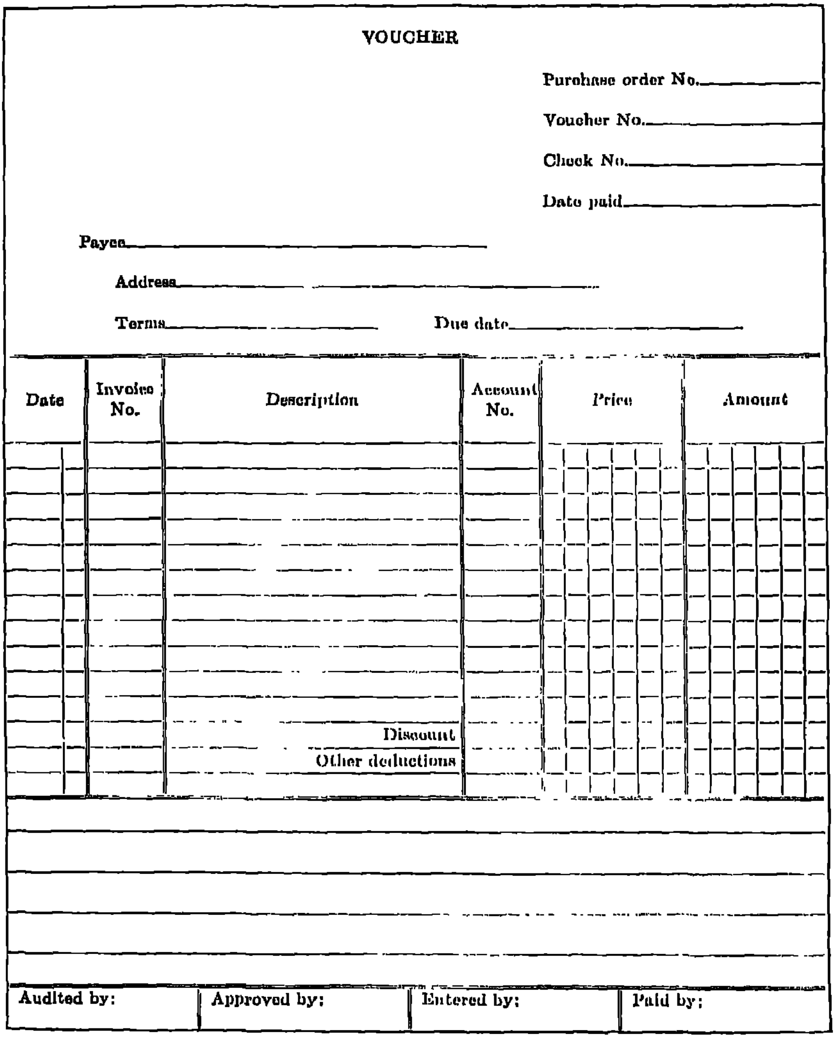
Approved________

Exhibit 5. Voucher jacket.

Several types of vouchers are in use. One form, illustrated as Exhibit 5, is known as the "voucher jacket." It is a jacket in which an invoice may be folded or to which the invoice and other supporting papers may be attached. It contains the voucher number, amount, date, payee, account or accounts to be charged, and approvals.

A second form of voucher, illustrated as Exhibit 6, is prepared when the invoice and other business papers in support of an expenditure are assembled. This form is not used generally because detailed information must be copied from the invoice.

A third form, which is a combination of a voucher and check, known as the "voucher check," is receiving favorable attention and use. A voucher and a check of regulation size are included as a single sheet of paper. The voucher and voucher check may be prepared at the same time, or, since the problem of discounts cannot always be determined until the actual disbursement is to be made, it is more common to record only informational data such as the voucher number, invoice number, and payee on the voucher check when the voucher is prepared. The voucher and voucher check combination form is usually designed so that it can be prepared with one insertion in a typewriter. The check which has a detachable statement with such information as invoice numbers, voucher number, amount of the invoice, and discounts taken, is sent to the creditor. He may deposit the check and keep the voucher form for his file. The copy of the voucher retained by the firm making the payment contains additional information including accounting distribution



VOUCHER

Purchase order No.__________

Voucher No.__________

Check No.__________

Date paid__________

Payee__________

Address__________

Terms__________ **Due date**__________

Date	**Invoice No.**	**Description**	**Account No.**	**Price**	**Amount**
		Discount			
		Other deductions			

Audited by:	**Approved by:**	**Entered by:**	**Paid by:**

Exhibit 6.

and approvals. After being sent to the accounting department, it is attached to the invoice and other business papers and becomes a part of the permanent records. An illustration of a voucher check is given as Exhibits 8 to 10.

The Voucher Register. The voucher register, as an adaptation of the use of special journals and a substitute for the columnar purchase journal and cash disbursement journal, contains columns to provide for entry of obligations incurred. Voucher registers have three important sections:

a. Description section, which includes Date, Voucher number, Creditor or Payee, Explanation, and Terms of payment.

b. Paid section, which shows date of Payment, Check number, and Check register folio reference.

c. Accounting distribution section, which includes columns for important purchase and cost controlling accounts with sundry account columns for inactive accounts.

In Exhibit 11 a voucher register is shown for a manufacturing concern.

Entries in the Voucher Register. After vouchers have been properly prepared and authorized, the appropriate data are entered in the voucher register. The most common plan is to enter the gross amount of the liability as a credit to Vouchers Payable, with debits being made to various purchase and cost controlling accounts. Any cash discounts to be taken are entered in the check register or cash disbursement book at the time the check is written.

The columns in the voucher register may be totaled and posted to controlling accounts monthly or as frequently as once a week.

Vouchers Payable Subsidiary. An advantage usually attributed to the use of the voucher system is the economy made possible through the elimination of an accounts payable subsidiary ledger. The subsidiary record commonly used in support of the Vouchers Payable account in the general ledger is the unpaid voucher file. After vouchers have been entered in the voucher register, they are filed by number, or occasionally according to creditors, in an unpaid voucher file.

The complete elimination of an accounts payable record is impractical in companies having a large number of unpaid vouchers, many of which

Voucher No.________ $________

Check No.________ $________

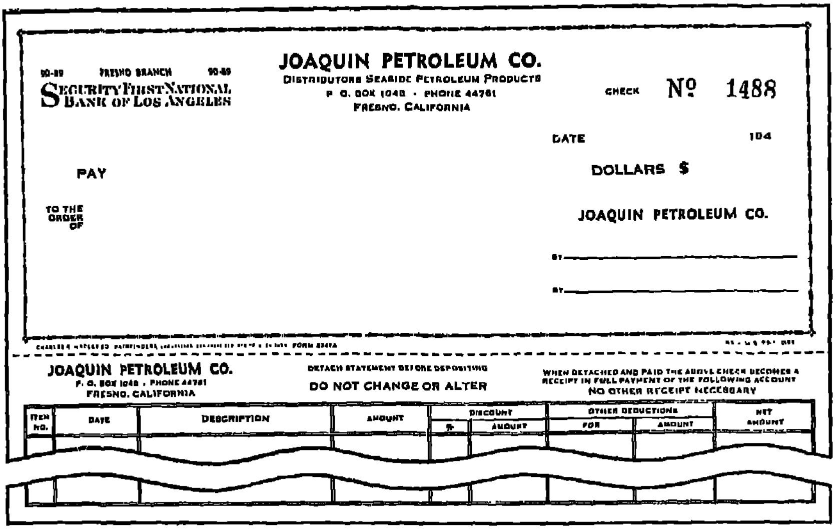
Date

Name________

Address________

Account charged	Code No.	Amount
Materials Control		
Payroll Control		
Factory Overhead Control		
Selling Cost Control		
Administrative Cost Control		
Machinery and Equipment		
Building and Equipment		
Delivery Equipment		
Total		

Exhibit 7. Reverse Side of Exhibit 6.



90-89 FRESNO BRANCH 90-89
SECURITY FIRST NATIONAL BANK OF LOS ANGELES

JOAQUIN PETROLEUM CO.
DISTRIBUTORS SEASIDE PETROLEUM PRODUCTS
P. O. BOX 1048 · PHONE 44781
FRESNO, CALIFORNIA

CHECK № 1488

DATE 194

PAY

DOLLARS $

TO THE ORDER OF

JOAQUIN PETROLEUM CO.

BY

BY

JOAQUIN PETROLEUM CO.
P. O. BOX 1048 · PHONE 44781
FRESNO, CALIFORNIA

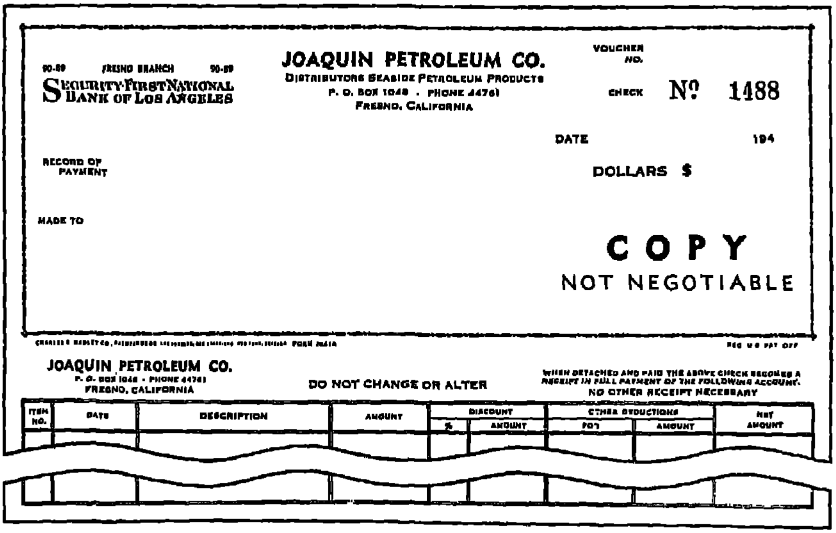
DETACH STATEMENT BEFORE DEPOSITING

DO NOT CHANGE OR ALTER

WHEN DETACHED AND PAID THE ABOVE CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE FOLLOWING ACCOUNT
NO OTHER RECEIPT NECESSARY

ITEM NO.	DATE	DESCRIPTION	AMOUNT	DISCOUNT		OTHER DEDUCTIONS		NET AMOUNT
				%	AMOUNT	FOR	AMOUNT	

Exhibit 8. Voucher check (original copy).



90-89 FRESNO BRANCH 90-89
SECURITY FIRST NATIONAL BANK OF LOS ANGELES

JOAQUIN PETROLEUM CO.
DISTRIBUTORS SEASIDE PETROLEUM PRODUCTS
P. O. BOX 1048 · PHONE 44781
FRESNO, CALIFORNIA

VOUCHER NO.

CHECK № 1488

DATE 194

RECORD OF PAYMENT

DOLLARS $

MADE TO

COPY
NOT NEGOTIABLE

REG. U. S. PAT. OFF.

JOAQUIN PETROLEUM CO.
P. O. BOX 1048 · PHONE 44781
FRESNO, CALIFORNIA

DO NOT CHANGE OR ALTER

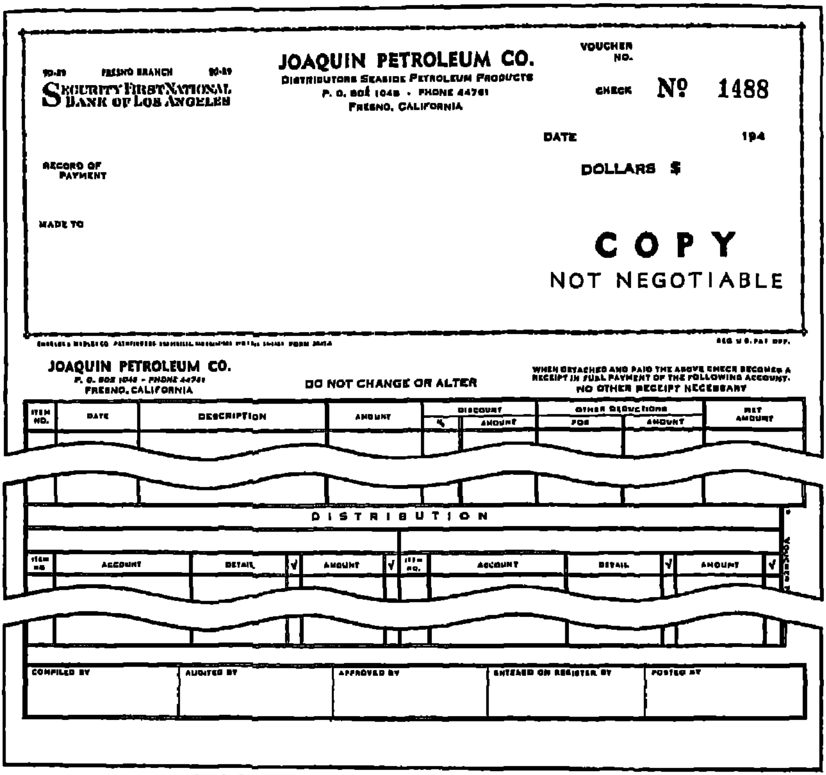
WHEN DETACHED AND PAID THE ABOVE CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE FOLLOWING ACCOUNT.
NO OTHER RECEIPT NECESSARY

ITEM NO.	DATE	DESCRIPTION	AMOUNT	DISCOUNT		OTHER DEDUCTIONS		NET AMOUNT
				%	AMOUNT	FOR	AMOUNT	

Exhibit 9. Voucher check (duplicate copy).

are payable to the same creditor. The unpaid voucher file does not disclose the total amount owed each creditor unless the vouchers are summarized and classified. To offset this difficulty, some concerns maintain a regular accounts payable ledger in addition to the unpaid voucher file. As a substitute for a complete accounts payable ledger, it is possible to use a supplementary file to facilitate the use of the unpaid voucher file as a subsidiary record. An alphabetical file of duplicate vouchers can be maintained to show transactions with each creditor; a card file exhibiting voucher numbers and amounts for each creditor can be used; or a third possibility is a card file by creditors showing the voucher numbers for each creditor.

The unpaid voucher file is supplemented with a tickler card system so that vouchers can be pulled in accordance with the terms of credit and of the discount period. Vouchers which have been delayed in preparation or in securing approvals are usually marked "rush" through a sticker or a special memorandum so as to be rushed through the formality of entry in the voucher register and the subsidiary records to the disbursing officer for payment within the discount period. When given special attention, invoices usually can be vouchered, the voucher approved, entered in the voucher register, and the disbursement check prepared in a few hours.



FRESNO BRANCH
SECURITY FIRST NATIONAL BANK OF LOS ANGELES

JOAQUIN PETROLEUM CO.
DISTRIBUTORS SEASIDE PETROLEUM PRODUCTS
P. O. BOX 1048 · PHONE 44761
FRESNO, CALIFORNIA

VOUCHER NO.
CHECK Nº 1488

DATE 194

RECORD OF PAYMENT

DOLLARS $

MADE TO

COPY
NOT NEGOTIABLE

REG. U.S. PAT. OFF.

JOAQUIN PETROLEUM CO.
P. O. BOX 1048 - PHONE 44761
FRESNO, CALIFORNIA

DO NOT CHANGE OR ALTER

WHEN DETACHED AND PAID THE ABOVE CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE FOLLOWING ACCOUNT. NO OTHER RECEIPT NECESSARY

ITEM NO.	DATE	DESCRIPTION	AMOUNT	DISCOUNT		OTHER DEDUCTIONS		NET AMOUNT
				%	AMOUNT	FOR	AMOUNT	

DISTRIBUTION

ITEM NO.	ACCOUNT	DETAIL	√	AMOUNT	√	ITEM NO.	ACCOUNT	DETAIL	√	AMOUNT	√

COMPILED BY	AUDITED BY	APPROVED BY	ENTERED ON REGISTER BY	POSTED BY

Exhibit 10. Voucher check (triplicate copy).

Check Register. The disbursing officer or cashier receives vouchers with the necessary supporting papers either directly after entry in the

EXHIBIT 11

LASALLE MANUFACTURING CO.

VOUCHER REGISTER

Date	Explanation	Terms	Vo. No.	Paid		Vouchers payable	Materials control	Payroll control	Factory overhead control	Selling cost control	Admin. cost control	Equipment	Sundry			
				Ck. No.	Date	Cr.	Dr.	Dr.	Dr.	Dr.	Dr.	Dr.	Account	L.F.	Dr.	Cr.
Oct. 1	Building rent		1	1	Oct. 1	$ 500			$170	$ 20	$ 60		Prepaid Rent		$ 250	
1	Melton Machine Co.	2/15, n/60	2	5	16	4,000						$4,000				
2	United Brass Co.	1/15, n/30	3	7	17	1,200	$1,200									
3	Union Pacific R.R. Co.		4	2	3	50						50				
4	Simplex Co.		5	14	31	60	60									
7	Postmaster		6	3	7	15	15									
12	Standine Co.		7			50				50						
15	Paymaster		8	4	15	1,680		$2,000					Accrued F.I.C.A. Tax			$ 20
													Accrued Income Tax Withheld			300
			9	Canceled	31	500*				500*						
16	White Advertising Co.		9			500				500						
16	Central Insurance Co.		10			120					10		Prepaid Insurance		110	
17	County Treasurer		11	6	17	1,200							Accrued Taxes		1,200	
					28	100*	100*									
20	Baylor Electric Co.	1/10, n/60	12	10	28	2,500	2,500									
22	Henry Snore		13	8	22	100							Prepaid Salaries		100	
25	N. Y. Central R.R. Co.		14	9	25	80	80									
29	National Equipment Co.	Cash	15	11	29	1,000						4,000				
	National Equipment Co.	30 da.	16			1,000										
	National Equipment Co.	60 da.	17			1,000										
	National Equipment Co.	90 da.	18			1,000										
31	Paymaster		19	12	31	1,853		2,200					Accrued F.I.C.A. Tax			22
													Accrued Income Tax Withheld			325
31	Power and Light Co.		20	13	31	170			80	30	60					
	White Advertising Co.		21	15	31	400				400						
	Stockholders		22			5,000							Dividends Declared		5,000	
						$22,878	$3,755	$4,200	$250	$500	$130	$8,050			$6,660	$667

* In red; deduction.

voucher register or from the file clerk in charge of the unpaid voucher file. It is the responsibility of the disbursing officer to check approvals and supporting papers authorizing payment of the voucher, to enter the voucher in the check register or cash disbursement journal, and to prepare the check in payment of the voucher for mailing.

The check register is a simplified cash disbursement journal which requires only three posting columns because charges to purchases and cost accounts are made in the voucher register. One debit column, Vouchers Payable, and two credit columns, Cash Discount and Cash, are the posting columns necessary. In lieu of one Cash credit column, two or more columns, one for each depository bank upon which checks may be written, are frequently substituted. Therefore there may be such columns as First National Bank, Second National Bank, and First State Bank. A form of check register is given in Exhibit 12.

Exhibit 12

Check Register

Date	Payee	Vo. No.	Ck. No.	L.F.	Vouchers payable	Cash discount	First National Bank	Peoples State Bank
					Dr.	Cr.	Cr.	Cr.

After vouchers have been entered in the check register and checks issued to creditors, a cross reference, showing the date the vouchers were paid and the check number, is made in the voucher register. Posting from the check register may be done monthly, weekly, or even daily.

Paid Voucher File. After vouchers have beeen passed for payment by the disbursing officer, they are filed in a paid voucher file. The vouchers are usually filed by number. It is convenient to have a cross index so that vouchers may be pulled either by number or creditor's name, since in practice many demands are made on the paid voucher file clerk for information concerning accounting entries and creditors.

It is customary in many concerns to have the canceled checks attached to the vouchers after the returned checks have been audited by the accounting division. The voucher, with its supporting papers, approvals, and the canceled check, constitute all the necessary informational base and evidence of the liability and payment that any auditor would require.

Special Problems in the Use of the Voucher System. When the voucher system is in use, special accounting treatment frequently is required for partial payments, purchase returns and allowances, and notes payable. Some difficulties arise when an invoice or obligation is payable in installments, since ordinarily a voucher represents a payment in full and has supporting papers attached to it. If the series of payments to be made are known in advance, a voucher covering each payment can be prepared at the same time, each voucher representing an installment. Supporting papers can be attached to either the first or last voucher of the series, and reference can be made to them on other vouchers. When regular installments are not planned in advance and a partial payment is to be made, it is customary to cancel the original voucher and to issue two or more vouchers in its place. The voucher is marked "canceled." In the voucher register the numbers and dates of the new vouchers are entered in the Paid column. The new vouchers are entered in the voucher register in regular order under the new numbers assigned to them; the amounts are entered in the Vouchers Payable columns as credits; and the total debit is made to Vouchers Payable in the Sundry section. Usually the special problems of handling partial payments are avoided by delaying the preparation of vouchers until it is known what the amount of each payment will be.

When goods are returned to the vendor for credit or special allowances are given after the voucher has been entered in the voucher register but before payment has been made, either the voucher must be canceled and a new one issued or a correction must be made. Corrections can be made in the voucher register in red ink immediately above the entries in the Vouchers Payable credit column and the purchases and cost controlling accounts debit columns. The red figures are deducted when columns are totaled and posted. Canceled vouchers can be treated in the same manner as in the case of corrections except that red ink entries must equal the original entries in amount.

When notes are issued for vouchers which have been entered in the voucher register, the voucher is canceled and a general journal entry is made debiting Vouchers Payable and crediting Notes Payable. When the note is due, a voucher is prepared for the payment and is entered in the voucher register as a debit to Notes Payable in the Sundry section and as a credit to Vouchers Payable.

CHAPTER III

CONTROL OF MATERIAL PURCHASING AND ISSUANCE

Need for Material Control. One of the first steps in the installation of a cost accounting system is planning the proper control of materials and supplies from the time orders are placed with suppliers until they have been consumed in plant and office operation or have been sold as merchandise. Materials or merchandise and supplies constitute the most important assets in the majority of business enterprises. The success of business concerns depends to a large extent upon efficient purchasing, storage, accounting, control, and consumption.

The human element is an important factor in the purchasing and control of materials. If purchasing is not centralized in a single department or person or is not handled by specialists, there is a tendency for department heads to overstock in regular materials and to expand the scope of their departmental activities and needs. Indulgence in equipment and supplies which may be deemed luxuries and not strict requirements of efficient operation is frequently another result of decentralized purchasing. Inefficient control over purchasing results in loss through failure to take advantage of quantity buying, inopportune buying, additional storage costs, depreciation and obsolescence, and ineffective employment of working capital.

Misappropriation, theft, and waste of materials and supplies are concurrent with a lack of system of control. It appears to be a quirk of human nature to consider that misappropriation and stealing of materials, supplies, and equipment are on a different ethical level than is the theft of cash or of negotiable instruments. An employee who considers himself strictly honest, even one who handles money in the cashier's cage day after day without thinking of absconding with a single dollar, may appropriate for his own use stationery, stamps, and other office supplies. Likewise an employee who is in charge of the gasoline and oil supply room may consider it his privilege to use certain of such supplies to operate his personal automobile. An inadequate system of material control is not fair to employees, and it is costly to the firm.

Even more serious losses are incurred by concerns in which the supply room is available to all employees without a check as to the quantities and purpose for which materials are to be used. The extravagant and wasteful use of material and supplies under such a system results in loss from spoilage of the excess withdrawn and from the lack of accurate computations of the amount of material or supplies needed for the day's work or for the specific job.

What Management May Expect of a System of Material Control. The important requirements of every system of material control are as follows:

a. Proper coordination of all departments involved in material purchasing, receiving, testing, approving, storage, accounting, and disbursing of funds.

b. Centralization of purchasing in a purchasing department under the direction and authority of a trained purchasing agent.

c. Use of standard forms upon which only properly written instructions are acceptable.

d. Use of materials, supplies, and equipment budgets so that economy in purchasing and use of materials can be realized.

e. Operation of a system of internal check so that all transactions involving materials, supplies, and equipment purchases are checked and approved by a number of properly authorized persons.

f. Storage of all materials and supplies in a designated location, properly safeguarded under supervision.

g. Operation of a system of perpetual inventory so that it is possible to determine at any time the amount and value of each kind of material in stock.

h. Assignment of a minimum quantity to each item of material, below which point the inventory is not allowed to drop, and of a maximum quantity, above which stock is not carried.

i. Operation of a system of stores control and issue so that there will be delivery of materials upon requisition to departments in the right amount at the time they are needed.

j. Development of a system of controlling accounts and subsidiary records which exhibit summary and detailed material costs at each stage of material receipt and consumption from the stockroom to finished goods.

k. Regular reports of materials purchased, issued from stock, inventory balances, obsolete stock, goods returned to vendors, and spoiled or defective units.

PURCHASING AND RECEIVING CONTROLS

Although details of procedure may vary with individual concerns, the important steps in the purchase and receipt of materials and payment of obligations incurred are as follows:

a. Initiation of purchase requisitions.
b. Preparation and execution of purchase orders.
c. Receipt of materials.
d. Inspection and testing of materials.
e. Adjustment of invoices.
f. Preparation and approval of vouchers.
g. Accounting procedure in the recording and payment of vouchers.

Purchase Requisition. A form known as a purchase requisition is commonly used as a formal request to the purchasing department to order goods or services. The purchase requisition serves the dual purpose of authorizing the purchasing department to make a purchase and provides a written record showing quantities, specifications, and date the purchase is required.

The forms are prepared by the stockkeepers for regular stock items which are below or are approaching the minimum quantity requirements. Requisitions are approved by an executive, such as the plant superintendent, who is in charge of stockroom operations. The original copy is sent to the purchasing department, the duplicate is retained by the stockkeeper initiating the purchase requisition, and the triplicate copy may be filed in the office of the authorizing executive. Purchase requisitions also may originate with department heads who require special equipment or materials not stocked as regular items. Requisitions for the purchase of specialized materials for production orders may originate either with the planning department or with the production manager. Approval by one or more executives other than the one originating the requisition is ordinarily required to secure a form of internal check to prevent unnecessary purchases.

PURCHASE REQUISITION

Purchase req. No.__________

Purchase order No.__________

Date__________

Please purchase for:

Department No.__________ Production order No.__________

Ship to:__________ Address__________

F. O. B.__________ Via:__________ Date required__________

Item No.	Quantity	Description of articles or services	Grade

Requested by:	Checked by:	Approved by:

Exhibit 13.

The purchase requisition, illustrated by Exhibit 13, contains the requisition number, date, department, quantity, description, specifications, signature of the person initiating the requisition, and signature of one or more executives approving the purchase. An order number is inserted when the purchase order is prepared. The price and vendor may be suggested on the requisition, but the final determination of the cost and supplier remains a problem for the purchasing agent.

Purchase requisitions for new machinery and equipment originate with production and service department executives, with the planning department or factory superintendent's office, or with a committee of executives who are responsible for planning capital expenditures. When the equipment is received, it is taken directly to the department where it is to be installed.

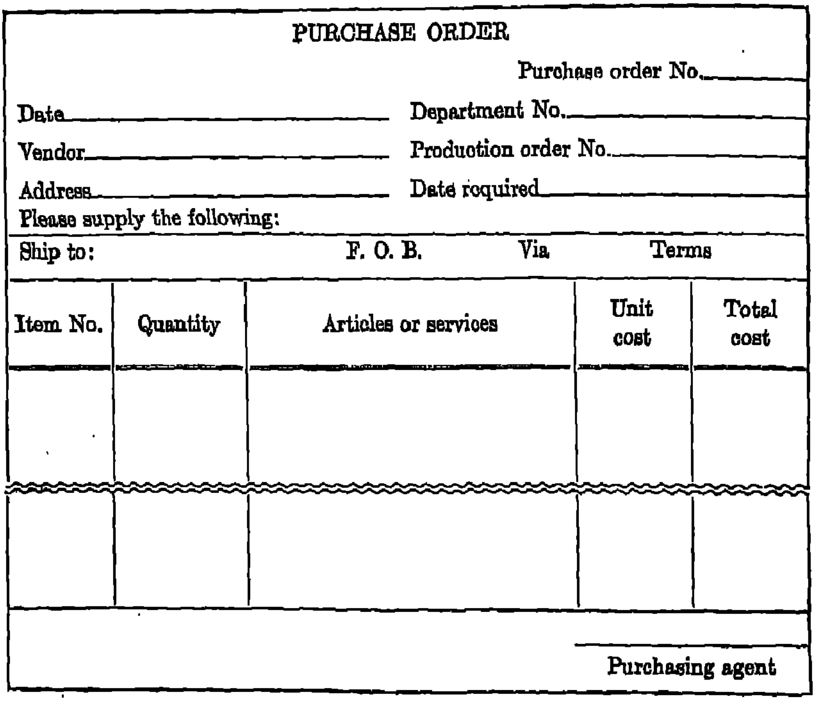
Purchase Order. When the original copy of the purchase requisition, properly signed by approving officials, is received by the purchasing department, the purchasing agent analyzes each case before making arrangements for the purchase. The need for the particular items requisitioned, the state of the company's financial position, and the trend of the markets and of general business conditions are factors which are considered before the purchase is made. The purchasing department investigates the sources of supply for the purpose of securing the highest quality materials at the lowest price, and due consideration is given to terms and delivery dates.

When the source of supply has been decided, the most common procedure is the preparation of a purchase order. A purchase order is a written authorization executed by the purchasing agent to a vendor to supply a specified quantity and quality of merchandise or equipment at a designated time. The purchase order is a necessary part of every good system of material control. It reduces purchasing and clerical work to a routine, provides vendors with complete specifications, prices, and shipping instructions, aids in checking orders received, furnishes a reference for future orders, and prevents duplication of orders and payments of invoices.

It is a policy of the majority of concerns that a purchase order must be issued for every order for material, supplies, or equipment, regardless of whether the purchase is made directly from salesmen, by mail, by telegraph, or by telephone. When purchases are made by personal interview, telegraph, or telephone, the purchase order acts as a confirmation to vendors as well as a record of unfilled orders.

The purchase order (Exhibit 14) is prepared from the specifications included in the purchase requisition and is signed by the purchasing agent. It contains the name of the vendor, department, in some cases the production order number, date required, a complete description of the goods or services required, terms, and prices. Shipping instructions may be designated by the traffic department of the purchasing company or the supplier. In purchasing specialized materials and equipment, the description may refer to drawings, blueprints, or pages of specifications; in cases of leases and agreements, contracts are attached as supplementary information. The original copy may be mailed to the vendor, the duplicate copy may be sent to the receiving department, and the triplicate copy may be retained by the purchasing department as a record of the unfilled order. A fourth copy may be prepared and routed to the stockkeeper or department head who initiated the purchase requisition as a notification of the purchase and expected delivery date; a fifth copy may be sent to the material accounting department for entry in the Ordered section of the appropriate stock ledger account.

doing so argue that checkers tend to be careless when they have before them a list of the items which are to be included in the shipment; consequently, they should be required to prepare a "blind receiving report" to show the quantity of goods actually received. The materials received report can then be checked against the purchase order by either the accounting or the purchasing department. The practice of using the "blind check" of goods by the receiving department contributes to effective internal control, but often employees in the receiving department are not capable of properly classifying materials received as to type and size. Frequently the materials received report may list descriptions and sizes which do not conform to the purchase order even though the goods are according to specifications.



PURCHASE ORDER

Purchase order No.________

Date________ Department No.________

Vendor________ Production order No.________

Address________ Date required________

Please supply the following:

Ship to: F. O. B. Via Terms

Item No.	Quantity	Articles or services	Unit cost	Total cost

____
Purchasing agent

Exhibit 14.

When difficulties are encountered in using the blind receiving report, the plan of preparing a copy of the purchase order with quantities omitted may be used by the receiving department. The copy serves as a notification to the receiving department of the expected shipment so that proper preparations can be made; it authorizes the acceptance of the goods; and it provides an accurate list of items ordered so that a rapid check can be made of goods received.

In case the plan of using materials received reports is used, the vendor, purchase order number, date, quantity, description, grade, and condition

MATERIALS RECEIVED REPORT
(To be used for all goods, materials,
supplies, and other services)

Received:

Purchase order No.________

At____________
Delivery point

From____________, ____________
Vendor **Address**

Date________

Quantity received	Description	Grade	Condition of goods

Counted by________

Approved by________
Receiving officer

Inspected by________

Title________

Exhibit 15.

of the materials are noted in the report prepared by the receiving clerk. One copy of the materials received report may be sent to the purchasing department; a second copy may accompany the goods to the stockroom; a third copy may be retained by the receiving department. Exhibit 15 is an example of a materials received report.

Inspecting and Testing Materials. Manufacturing concerns may have a testing department. The function of this department is to inspect all goods and equipment received before they are removed from the receiving department to make certain that purchase order specifications have been met. Samples are subjected to laboratory tests before final approval of goods received is given. Results of the inspection and test are indicated in a special testing report prepared in triplicate; one copy is sent to the purchasing department, a second copy to the office of the plant superintendent or the production manager, and the third is retained in the testing department file. An unfavorable testing report is used by the purchasing department in obtaining adjustments or as authority for the return of goods to the vendor. The testing department is invaluable to department heads and to the purchasing department in preparing specifications to be included in purchase requisitions and in purchase orders.

Adjustment of Invoices. When the purchase order, the materials received report, or the testing report indicates that the goods or equipment received are not of the type ordered, are not in accordance with specifications, or are damaged, the purchasing department issues a return shipping order indicating that the goods are to be returned to the vendor. The return shipping order is prepared in triplicate; the original is mailed to the vendor, the duplicate is sent to the receiving department, and the triplicate is attached to the invoice.

If the unsatisfactory goods or equipment are retained, an adjustment is requested by the purchasing department from the vendor. The invoice is not vouchered for payment until a credit memorandum is received from the vendor.

Approval of Invoices and Preparation of Vouchers. When the invoices of goods and services are received by the purchasing department, the process of assembling the business papers connected with each purchase and the preparation of the voucher begin. In some concerns the purchasing department takes the initiative in preparing the voucher and in assembling the necessary supporting papers, while in other concerns the work is done by the accounting department; in either case the process is identical. The invoices received from the vendor form the nucleus upon which the evidence and approval of the obligation are based. The forms assembled in support of the invoice include:

a. Purchase requisition.
b. Purchase order.
c. Receiving report or copy of purchase order approved by receiving department.
d. Testing report.
e. Return shipping order or debit or credit memorandum.

A copy of the purchase requisition and a copy of the purchase order are taken from the purchasing department files and are compared with both the invoice received from the vendor and a copy of the material received report or the receiving department's copy of the purchase order to see that the goods or services received conform in quantities and prices to those requisitioned and ordered. The business papers may be attached to the invoice, and all the extensions and additions are checked for mathematical accuracy.

The next step is the preparation of the voucher which, when properly approved, is the authority to the accounting department to record the obligation and to the disbursing department to pay the vendor. The voucher may carry a complete description of the goods or services received, or it may refer to the invoice for details. In either case the voucher lists the vendor, the character of the purchases, the amount of the invoice, and the discounts offered. The voucher with the invoice and other supporting papers is sent on a round of executive offices for approvals of the purchase. Frequently signatures obtained for a purchase include those of the purchasing agent, comptroller, and department head or stockroom supervisor initiating the purchase requisition. In cases of large orders or contracts the approval of the voucher by the president or a committee of the board of directors may be required.

Accounting Treatment of Purchases. The comptroller or an accounting officer usually indicates the account or accounts to be charged when approving the voucher. The voucher, when properly approved, is entered in the voucher register as a debit to such accounts as Materials Control, Office Equipment, and Factory Equipment, and as a credit to Vouchers Payable.

The voucher, with the invoice and other supporting papers, is filed according to number in an unpaid voucher file to await its submission to the disbursing officer for payment. It is withdrawn from the unpaid voucher file just before the discount date, or when the payment date arrives, and is submitted to the disbursing officer for payment. An entry is made in the check register debiting Vouchers Payable and crediting Cash and Cash Discount. The paid voucher and supporting papers are placed in a paid voucher file located in the accounting department.

RECORDS FOR MATERIALS

Determining Material Requirements and Initiating Purchase Requisitions. The stockroom organization should be so planned as to secure specialization in stockrooms and in the duties of stockkeepers. Stockrooms can be located throughout the plant according to material requirement of types of departments. Thus a stockroom may be used exclusively for storing raw materials and located so as to supply the foundry; a stockroom containing semifinished materials may be located in the proximity of the machine shop; finished parts may be stored within easy access of the assembly departments; and office supplies may be in a stockroom in the office building. If one or more large centrally located stockrooms are used, specialization and arrangement by type of materials are planned within each stockroom in accordance with the requirements of divisions and departments of the company.

Since each stockkeeper serves a certain group of departments, he becomes a specialist in knowing the nature and the quantities of materials required. He learns from experience the changes in seasonal demands, the kinds of material which are standard requirements, and the materials which are desired only for special orders. Stock cards, shelf name plates, and stock ledger cards generally are marked with minimum quantities; whenever the stockkeeper notices through observation of the quantities on hand or of the stock records that the minimum is being approached, he prepares a purchase requisition requesting the purchasing department to replenish the materials in question.

Storing and Safeguarding Materials. After materials have been unpacked and quantities checked against the purchase order by the receiving department, they are sent to the stockroom storing the particular type of materials received. They are checked in by the stockkeeper who, after their receipt, is held accountable for any shortage or spoilage. The stockkeeper usually acknowledges receipt of materials in a copy of the receiving department's report or in a special notification form.

Materials and parts specially ordered for emergency use for special jobs or machines may not be taken through the stockroom because of the delay the storeroom checking and issuing would cause. But, even though materials are routed directly to production departments, it is desirable to record their receipt and issuance from the invoice or receiving department report in the stock records; the stockkeeper usually inspects and counts them in the department to which they are taken directly.

Materials should be stored in stockrooms protected with walls or wire screen and equipped with doors and delivery windows that are locked when not in use. Every item should be numbered or coded, and should be stored in a definite location noted in a location book or on cards at the end of each aisle, section of shelves, or bin so it may be found instantly. When materials are so bulky that they cannot be stored in stockrooms, they may be piled in sheds or protected yards or stored in containers, but in all cases they should be under the custodianship of a stockkeeper and should be issued only under his supervision. Whenever possible, materials should be packaged in amounts determined by the quantity usually requisitioned in order to save time in issuing. Materials subject to depreciation or obsolescence should be arranged on shelves or in bins in such a way that the oldest items are issued first.

Perpetual Inventories. A perpetual inventory system consists of maintaining for each type of material an accounting record showing the quantities and value of materials received, issued, and on hand. The perpetual inventory record may give such additional information as goods ordered, expected delivery date, and unit costs. The advantages of maintaining perpetual inventory records are as follows:

a. The investment in material and supplies may be kept at a minimum.

b. Management may be informed daily of the number of units and the value of each kind of material on hand, information which tends to eliminate delays and shutdowns in plant activities.

c. The cost department has control over costs, because perpetual inventory records and material requisitions provide a record of material costs for individual products, production orders, and departments.

d. It is possible for the financial division to prepare monthly or quarterly profit and loss statements and balance sheets without a physical inventory being taken.

e. A system of internal check is in force at all times, with the activities of the purchasing department, stockroom divisions, and production or merchandising departments being checked against each other.

f. Frequent physical inventories need not be taken.

Records for Materials. The records generally used in maintaining a system of perpetual inventories and proper control of the issuance of materials consist of stock or bin cards, stock ledger accounts controlled by one or more accounts in the general ledger, material requisitions, a materials and supplies requisition journal, and returned material reports.

STOCK CARD

Location__________ Maximum__________

Material__________ Minimum__________

Date	Quantity received	Quantity issued	Balance	Condition

Exhibit 16.

Stockkeepers usually account for materials in their stockrooms on stock cards (Exhibit 16) which may be attached to each bin, shelf, or other form of containers. Stock cards are used as a record of the quantities of each type of material received, issued, and on hand each day. The cards are not considered as accounting records; they are memorandums for the purpose of informing stockkeepers of the quantities on hand and are used as a check on the stock ledger accounts in the material accounting division.

In large concerns there is usually a divorcement between stockkeeping activities and maintaining accounting records for materials received and issued. The separation of the subsidiary stock ledger from the stockroom is considered desirable, because it inserts another form of internal check into the system of material control. The stock ledger accounts may be in a separate material accounting department or in the cost department, or in small enterprises, where a division of labor is not possible, they may be handled by the stockkeeper in addition to his regular stockkeeping activities. Stock ledger accounts are used as a record of each kind and class of materials carried in stock. The set of stock accounts constitutes the subsidiary stock ledger which is controlled by an account termed Materials Control or Stores Control in the general ledger.

The type of stock account used varies with the concern. A common form is the perpetual inventory card, which can be altered or replaced in the card file when changes occur in the type of material carried in stock. Bookkeeping and tabulating machines can be used to good advantage in posting receipts and issues and in computing balances in subsidiary material records. Exhibit 17 is illustrative of a stock ledger account. Entries are made in the Ordered section when a copy of the purchase order is received by the material accounting department from the purchasing department. When materials are received and checked by the stockkeeper, entries are made in the Received section directly from the invoice or receiving department report. Entries for quantities are recorded in the Issued section from material requisitions received from stockkeepers for materials issued to service and production or merchandising departments.

The stock ledger sheets of many concerns contain a Reserved or an Appropriated section which is inserted between the Received and Issued sections to show the quantity of the material reserved for special orders. The section is generally used as a memorandum and contains columns for date, production order, and quantity. The Reserved section serves the purpose of indicating the materials to be required for production in process or to be put in process in the near future. The quantity of materials reserved does not affect the Balance section of a stock ledger account until the materials received are actually issued.

It is a rigid policy of every good system of material control that no materials can be issued from stockrooms except on properly prepared and approved material requisitions. The material requisition is a written order to the stockkeeper to deliver designated materials to a certain department at a specified time. Each stockkeeper is supplied with the names and signatures of department heads and foremen who are authorized to requisition materials. The material requisition, illustrated as Exhibit 18, includes date, requisition number, department charged, name or symbol of stock ledger account to be credited, description of materials, quantity, unit price, total value, delivery point, signature of person requisitioning the material, and signature of the department executive approving the request for material. The production order number is also

EXHIBIT 17

STOCK LEDGER SHEET

Article ______ Code No. ______

Size or type ______ Section ______ Bin No. ______

Unit ______ Maximum ______ Minimum ______

	Ordered				Received					Issued						Balance		
	Date	Purchase order No.	Quantity	Date expected	Date	Purchase order No.	Quantity	Unit cost	Total cost	Date	Requisition No.	Department or production order No.	Quantity	Unit cost	Total cost	Quantity on hand	Unit cost	Total cost

MATERIAL REQUISITION

Requisition No.__________

Date__________

Deliver to__________ Charge__________

__________Department __________

Quantity	Code number	Description	Unit cost		Amount	

Requisitioned by__________ Approved by__________

Exhibit 18.

included in requisitions of manufacturing concerns which use a job order cost system.

ISSUANCE OF MATERIALS

Procedure of Issuing and Accounting for Issued Materials. A common procedure used in issuing materials is described as follows. Material requisitions are authorized and prepared by the planning department in some concerns and by department executives or foremen in other concerns. The material requisition is prepared in duplicate and shows description and quantities of materials required by a department or process. Both copies of the requisition are sent to the stockkeeper who issues the material and records the quantities disbursed in the Quantity Issued section of the appropriate stock or bin cards. Then both copies of the material requisition are sent to the material accounting division for pricing and entry in the stock ledger. The pricing clerk enters the unit price and the total cost of material on both copies of the requisition.

One copy of the requisition is retained by the stock ledger clerk; the other copy is sent to the cost clerk, department head, or foreman who uses it as the basis for a charge to the appropriate production order or department for which the material was issued.

The stock ledger clerk's copy of the requisition is used as the basis for an entry in the Issued section of stock ledger accounts showing the date, requisition number, department symbol or production order number, quantity, unit cost, and value. The Balance section of the stock ledger accounts is then completed to show the new balance figures for quantity, unit cost, and valuation.

Materials Control is a general ledger controlling account which may be used to summarize all stock ledger accounts. It is debited for all materials and supplies purchased, and it is credited for the total amount of materials and supplies issued to departments or processes. A recapitulation of material requisitions which are sorted by departments, by processes, or by direct and indirect materials, depending upon the type of concern, is the basis for the preparation of the following journal entries:

For concerns in which costs are prepared for each production order:		
Materials in Process	xxx	
Materials Control		xxx
To record the summary of direct materials issued from stockrooms for production on job orders for January.		
For concerns using process cost methods to obtain average costs per unit:		
Process I	xxx	
Process II	xxx	
Materials Control		xxx
To record the summary of direct materials issued from stockrooms for production in processes for January.		
For concerns using either or both of the above types of cost system:		
Factory Overhead Control	xxx	
Materials Control		xxx
To record summary of indirect materials issued from stockrooms and classified as factory overhead costs for January.		

A detailed explanation of accounts to be charged for materials consumed is given in later chapters.

In many concerns, it is the practice to use a Materials and Supplies Requisition Journal instead of preparing summary journal entries for items requisitioned from stock. Such a record is illustrated as Exhibit 19. Material requisitions may be entered in the Materials and Supplies Requisition Journal individually or in summary daily or weekly, depending upon the number of requisitions involved.

Special Types of Material Requisitions. Departments having standard material requirements or a comparatively fixed list of materials or supplies generally use a special form of material requisition. One form termed a "bill of materials" is similar to a laundry slip in form and lists

EXHIBIT 19

MATERIALS AND SUPPLIES REQUISITION JOURNAL

Date	Req. No.	Job or dept.	Description	Materials control Cr.	Materials in process Dr.	Factory overhead control Dr.	Selling cost control Dr.	Administrative cost control Dr.	Plant and equipment Dr.	Sundry		
										Amount Dr.	L.F.	Account

the names or symbols of all materials regularly requisitioned. In preparing such a requisition, it is necessary only to indicate the quantity in the blank space in front of the name or symbol of the material required. The items of materials not usually required can be written in the blank space at the bottom of the requisition, or a blank requisition form can be prepared.

A second plan can be used successfully in concerns manufacturing a standard product or having uniform processes such as assemblies. Departments can supply stockkeepers with a list of parts or materials needed to complete a certain job or assembly designated by a name or symbol. Instead of listing all the materials required, a department head or foreman can specify in a requisition the number of jobs or assemblies of a certain type scheduled for production, and the stockkeeper can fill the order from his list of parts or materials needed.

Requisitioning Small and Indeterminable Quantities. Small items of material, such as nails, screws, bolts, ink, glue, and chemicals, are requisitioned by weight or measure. Since departments frequently cannot determine in advance the quantity needed, a requisition is prepared, but the quantity and cost are omitted temporarily. The stockkeeper issues a quantity and holds the requisition until the material is reported to be consumed or until a portion of it is returned. The requisition is then sent to the pricing clerk in the material accounting department to be costed and entered in appropriate stock ledger accounts; the duplicate is given to the department consuming the materials.

Materials Returned to Vendors. When materials are returned to the vendor after having been received in stockrooms and entered in stock ledger accounts, two different correcting entries can be made. From the return shipping order issued by the purchasing department, information regarding the quantity and value may be entered in the Received section of the stock ledger accounts in red ink, or an entry can be made in the Issued section with a special notation or symbol to indicate that the goods were returned to the vendor and not issued to departments or processes. The first entry emphasizes the nature of the transaction, makes easier the preparation of material summaries, and may reduce clerical errors. The entry in red also provides a visual aid in obtaining proper managerial control of the volume of purchase returns.

Materials Returned to the Stockroom. Material requisitioned from a stockroom and not needed or found to be defective is returned to the stockroom, where a returned material report is prepared either by the person returning the material or by the stockkeeper upon receipt of the material. Two copies of the report are usually required; the original is used as a basis for entries correcting the stock ledger accounts, while the duplicate is retained in the files of the department returning the material to stock.

Since the material returned to the stockroom is a reduction in the amount recorded as issued, the preferable method is to enter the number of

EXHIBIT 20

MATERIALS AND SUPPLIES RETURNED JOURNAL

Date	Req. No.	Job or dept.	Description	Materials control Dr.	Materials in process Cr.	Factory overhead control Cr.	Selling cost control Cr.	Administrative cost control Cr.	Plant and equipment Cr.	Sundry		
										Am't	L.F.	Account

units and the value of material received in red ink in the Issued section of the stock ledger accounts. When a summary of material issued is prepared, the amount and value of goods returned to the stockroom are deducted from the total issued, and the amount returned by each department, as shown by the returned material slips, is deducted from the total amount charged to each department. Another method of entering materials returned to the stockroom in the stock ledger accounts is to put the number of units and the value in the Received section, with a special notation or symbol to prevent the entry being considered a receipt of new materials. The entry in red offers the advantage of providing a visual aid to management in isolating departments that consistently overrequisition materials.

If entries have already been recorded in general ledger control accounts for goods issued from stock which are later returned, the following correcting journal entries may be made for the value of goods returned to the stockrooms:

For concerns in which costs are prepared for each production order:
Materials Control xxx
Materials in Process xxx
To record the summary of direct materials returned from production to stockrooms.

For concerns using process cost methods to obtain average costs per unit:
Materials Control xxx
Process I xxx
Process II xxx
To record the summary of direct materials returned from production processes to stockrooms.

For concerns using either or both of the above types of cost systems:
Materials Control xxx
Factory Overhead Control xxx
To record the summary of indirect materials returned to stockrooms.

In enterprises where the return of materials to stock is a major problem, it is customary to use a Materials and Supplies Returned Journal (Exhibit 20) so that a detailed, permanent record of items returned to stock will be available.

CHAPTER IV

MATERIAL INVENTORY CONTROL AND VALUATION

DETERMINATION OF COST OF INCOMING MATERIALS

The proper valuation of materials received and placed in stock is an important cost accounting problem. The question arises as to what elements of cost should be included in the valuation of materials. The invoice price of materials at the vendor's shipping point, less all trade discounts offered, plus transportation costs to the receiving department of the concern making the purchase may be called the visible cost items which are usually recognized in the accounting records. From the point of view of sound accounting theory, cash discounts taken may be deducted from the invoice cost of materials, or, depending upon the policy of the individual concern, they may be treated as an income element. But what disposition should be made of other material costs which are less tangible in character, such as cartage, receiving, unpacking, inspection, testing, insurance, storage, material accounting, and purchasing costs? These costs are just as legitimately a part of the cost of putting materials in a usable state as are the invoice and transportation costs.

All costs of whatever nature incurred up to the point of placing materials and supplies in a condition suitable for issuance from the stockroom should compose the cost value of materials. For practical purposes, in order to avoid the difficulties of determining the amount of receiving, handling, purchasing, and storing costs applicable to each shipment of materials received, many concerns limit the computation of material costs to invoice costs, less trade discounts, plus transportation charges. All other material costs are considered overhead costs of the period in which the purchase was made and the goods received. Such a treatment affords an easy way of handling a difficult cost problem, but it does not present an accurate cost analysis or a correct valuation of materials. Few concerns purchase materials in the same quantities during each month of the year. Production and sales are seasonal, which requires that purchases be made months in advance of production. Normally the automobile industry has its peak production beginning in August and extending to April, on a decreasing basis after February. Sales of new cars increase late in the fall and reach a peak beginning in January. In such industries the purchasing and handling of materials must come in advance of production; many types of raw materials and finished parts are contracted for many months in advance of actual consumption. If purchasing, receiving, and other forms of handling costs are treated as overhead costs, it means that they are charged to production or to profit and loss in the month incurred. Thus a particular month or a 3-month period may be charged for purchasing and handling materials which are not to be requisitioned out of stockrooms for production or sale as finished products until subsequent periods. During periods when heavy purchases are being made, expenses charged to profit and loss are overstated, and the value of materials in stockrooms is understated, with a resulting understatement of profits for the period. During periods of heavy production and sales, the cost of goods manufactured and sold is understated, costs of purchasing, receiving, and handling goods are understated, and profits are overstated. However, it is evident that, if business concerns are not subject to seasonal fluctuations in purchases, production, and sales, an understatement of material inventory values is the only result.

A practical application of the inclusion of all elements of cost in inventory values is found in the adjustment of fire losses by insurance companies. It is recognized by the courts and insurance companies alike that the value of inventories destroyed by fire consists of all costs of purchasing, receiving, and handling the merchandise or materials up to the point where it is in a salable state. The total cost value is adjusted for depreciation in the value of the goods due to changes in market prices, in stlyes, and in physical condition.

Control of Cash Discounts. Sound accounting theory permits purchases to be recorded either at the gross price, with cash discounts treated as income when the invoice is paid, or at the net invoice price, with discounts deducted.

When the "gross price" method is used, discounts are recorded as a credit in the Cash Discount account. A careful check of all payments is required in order to determine if any discounts have been missed.

The "net price" method provides for the deduction of the cash discount when the purchase is recorded. A Cash Discount Lost account is used to record any of the discounts not taken. Managerial attention may be focused immediately on any discounts that have been lost, and appropriate action may be taken to determine the cause of the exception to the established policy of taking all discounts. If management desires information concerning the amount of cash discounts taken during an accounting period, a *memorandum* column may be inserted in either the voucher register or.the check register to accumulate the data.

A balance in the Cash Discount Lost account may be treated as an administrative cost if it has resulted from causes within the control of management; it may be added to purchases as a cost if it is considered an element of inventory value; or it may be treated as a nonoperating expense if it is considered to be a financial item.

Applied Purchasing and Handling Costs. If it is assumed that the cost of material should include the price paid to the vendor after deducting both trade and cash discounts and adding freight charges, cartage, receiving, testing, insurance, and storage costs, an applied rate can be used to add an estimated amount of handling costs to invoices of materials received. Although it is logical to include purchasing and material accounting costs in the group to be applied, it may be impractical and unnecessary in most concerns, since such costs usually remain fixed throughout the year in spite of seasonal conditions of purchases, production, and sales.

The use of a predetermined applied purchasing and handling cost rate has the following advantages:

a. A normal or average rate, based upon planned activity of purchasing for an operating cycle, usually 1 year, can be computed.

b. Problems associated with seasonal fluctuations in material receiving and handling costs and in the amount of purchases are mitigated.

c. Daily entries in perpetual inventory records for materials received will include an estimate for purchasing and handling costs; otherwise inventory value of materials will be understated.

d. The use of budgets to determine the applied rate enables a comparison to be made between actual purchases and costs of procuring these purchases and the planned volume of purchases and budgeted purchasing and handling costs.

One group of purchases includes merchandise or semiprocessed parts which are either salable, further processed, or used in assemblies in the finishing departments. These parts are purchased according to standard specifications, are contracted for some time in advance, and usually are not susceptible to current market price changes. The production and sales budgets exhibit the expected production and sales, broken down by units and by classes of products for the budget period, which give the purchasing department adequate information as to the quantity of each class of material needed for the budget period. The actual contract price per unit, plus an estimated amount of freight, receiving, handling, storage, and purchasing cost, should constitute the cost of material for the period. To obtain the estimated amount of these various charges for the period, the management should resort to overhead cost budgets for estimates of freight-in, cartage, receiving, uncrating, counting, testing, storage, insurance on the goods, and perhaps of purchasing department costs. The total amount of the estimates should be divided by the total number of units to be purchased or by the total contract price, less trade and cash discounts, to obtain the estimated amount of handling charge to be applied to each unit or dollar of purchase. In many cases the purchase requirements of this class of materials will be so varied that the number of units will be an impractical basis for the application of the receiving and handling charges, and it will be necessary to resort to the value of the purchases in terms of dollars.

A hypothetical case will make the above-mentioned method more easily understood. It may be assumed that the X Manufacturing Co. uses 50 different classes of parts which are purchased in completed form, ready for assembly. Definite price contracts are entered into for the 6-month budget period for this class of material at a total net cost of

$24,000, trade and cash discounts having been deducted. The cost budgets show estimates for these purchases for the period as follows: freight-in, $400; cartage, $50; receiving department costs, $200; storage, $50; insurance, $25; and purchasing department costs, $475. Using the contract cost of the material as a basis, the formula is as follows:

$$\frac{\text{Estimated receiving and handling charges for budget period}}{\text{Cost of materials for the period (contract price)}} =$$

$$\frac{\$1{,}200}{\$24{,}000} = 5\%, \text{ the amount to be applied to each dollar of purchases}$$

Therefore, if casting 2056 had a contract price of $1 per unit, $0.05 would be added for receiving, handling, and purchasing cost. The cost price for the part for the period would be $1.05, and this amount would be entered in the Received section of the stock ledger sheet for castings.

If materials are not contracted for in advance, the quantity requirements can be obtained from the purchasing budget and existing price lists can be resorted to for price estimates for the budget period. The same procedure of applying receiving, handling, and purchasing costs to material can be followed, except that the denominator in the formula would be "estimated cost of materials for the period" instead of the actual contract cost.

Separate Applied Purchasing and Handling Rates. The apportionment of applied purchasing and handling costs to materials and supplies by means of the blanket rate method, explained in the preceding paragraph, can be criticized justifiably on the grounds that there is no direct relationship between the invoice price of materials and supplies and such costs as purchasing, receiving, and storage. The application of purchasing and handling costs to materials and supplies can be obtained *in a more equitable manner by using a separate rate for each class of cost.* The preparation of separate budgets for such classes of cost as purchasing department, receiving department, testing, and storage makes possible the selection of more equitable bases of distributing applied cost and the preparation of separate rates. Purchasing department costs are incurred largely in proportion to the number of purchase orders issued, since the cost of investigating prices of and ordering office supplies costing $10 may involve as much time as does placing an order for raw materials in the amount of $1,000. The estimated number of shipments, estimated number of articles, or estimated weight in pounds or tons of shipment, depending upon the circumstances in a particular concern, are usable bases for applying receiving department costs to material and supplies received. Storage costs can be apportioned on the basis of estimated space required for each class of materials; testing costs can be apportioned on the basis of estimated number of tests to be made; freight-in can be charged directly to each shipment, allocated in accordance with the invoice cost of each class of materials or divided among items in the shipment according to classified freight tariffs.

Thus, instead of computing a single rate for applying purchasing and receiving costs, a separate rate can be computed for each class of cost as suggested by the following formulas:

$$\frac{\text{Estimated purchasing department cost for budget period}}{\text{Estimated number of purchases for budget period}} = \text{rate per purchase}$$

$$\frac{\text{Estimated receiving department cost for budget period}}{\text{Estimated number of items to be received during budget period}} = \text{rate per item}$$

$$\frac{\text{Estimated storage cost for budget period}}{\text{Estimated cubic feet of storage space to be occupied by purchases}} = \text{rate per cubic foot}$$

$$\frac{\text{Estimated testing department cost for budget period}}{\text{Estimated number of tests to be made for budget period}} = \text{estimated cost per test}$$

Accounting Procedure for Applied Purchasing and Handling Rates. The following general ledger controlling accounts may be used in accounting for actual and applied purchasing, receiving, and handling costs:

Materials Control: debited for the purchase price of materials, less trade and cash discounts, plus the receiving and handling costs applied to the net purchase price.

Applied Material Receiving and Handling Costs: credited for the amount of the purchasing, receiving, and handling costs applied to the net purchase price of materials; debited for the balance of the account transferred to the Material Receiving and Handling Cost Variance account.

Actual Material Receiving and Handling Costs: debited for actual receiving and handling costs; credited for the balance of the account transferred to the Material Receiving and Handling Cost Variance account.

Material Receiving and Handling Cost Variance: debited or credited for the difference between the actual and the applied material receiving and handling costs for the accounting period; balance of the account transferred to Profit and Loss and/or to Deferred Material Receiving and Handling Cost account.

If a voucher system is employed, a separate column may be maintained in the voucher register for each of the first three accounts listed above. Entries would be made in the Materials Control and the Applied Material Receiving and Handling Costs columns when vouchers for material purchases are recorded in the voucher register. Likewise vouchers for actual material receiving and handling costs would be entered in the voucher register as debits in the Actual Material Receiving and Handling Costs column. These columns would be posted in total to the general ledger accounts at the end of the accounting period. Additional charges would be made to the Actual Receiving and Handling Costs account for expired insurance, depreciation, taxes, rent, and salaries by means of adjusting journal entries at the end of the accounting period.

The daily accounting entries in the subsidiary material records consist of a charge in the Received section of the stock ledger sheets in the stock ledger for the estimated amount of handling costs applied to the net invoice cost of materials purchased, either as a separate item or included in the cost of material.

A balance in the Material Receiving and Handling Cost Variance account at the end of the accounting period should be investigated and the causes of the variance determined. If, at the end of a month or quarter, the variance is considered to be the result of seasonal conditions of purchases and costs and a normal applied rate has been used, the balance in the variance account should be treated as a deferred item on the monthly or quarterly balance sheet because it will be offset by counteracting conditions in other periods of the year. If the variance is considered to be the result of using an incorrect rate, the balance should be closed to Profit and Loss and a new rate should be computed for use during subsequent months. If at the close of the fiscal period there is a balance in the variance account, it should be considered to be the result of using an incorrect rate and should be transferred to Profit and Loss.

VALUATION OF INVENTORIES

The proper valuation of inventories is so ably discussed in a number of articles and books dealing with accounting principles that this text presents only the point of view which is an outgrowth of the development of cost accounting.

The four principal bases of inventory valuation are as follows:

a. Actual cost.
b. Cost or market whichever is lower.
c. Replacement cost.
d. Selling price.

The actual cost of raw materials and finished parts is the most logical method of valuing inventory if a consistent policy in cost accounting technique is followed. The cost accountant gathers for management information based on actual costs for departments, operations, territories, products, and jobs, and expected profits or losses do not become a part of the statistics until realized through the sale of commodities or through liquidation of the enterprise. In order to conform to a strictly cost valuation basis, inventories should be shown at cost. The following arguments are given in favor of cost as a basis for the valuation of inventories.

a. Cost is a uniform basis which can be applied to all the elements of inventory and used consistently period after period.

b. The fact that there are changes in prices of raw materials or merchandise does not necessarily mean that goods sold will be subject to the same price reactions.

c. Material or merchandise is but one element of cost in the product sold; in many concerns labor and overhead costs are of much greater significance in determining the final cost.

d. It is difficult to determine market prices of highly specialized raw materials, of semifabricated parts, and of work in process.

e. It is an important accounting principle that assets, including inventories, are worth what they cost until proved otherwise through sale, due consideration being given to physical depreciation and obsolescence.

f. If normal quantities are purchased and the first-in, first-out method is used, the last cost price approximates the market value or replacement cost.

g. When cost is used as a basis, no anticipated losses are allowed to affect current operations before being realized through sales.

h. Market prices can be compared with costs statistically in reports and financial statements without changing the accounting records from a cost basis.

A common objection to the cost basis for valuating inventories grows out of the proper balance sheet valuation. If market prices have decreased as compared with actual costs, it is contended that an inventory on a cost basis does not exhibit correct values. It is not a serious objection because, if there are important changes in market values, the inventories can be shown at cost and the present market value can be indicated in a bracket or a footnote, or through the use of an appropriate reserve. The alternative methods of computing actual costs are described on page 61.

The cost or market whichever is lower valuation method is based on the theory that, if market prices are less than the cost of materials or merchandise, there will be a corresponding price change in the products offered for sale. The anticipated losses are provided for by an adjustment to inventories with the loss shown in the Profit and Loss account for the period. It is not well adapted for use in manufacturing concerns, because difficulties are encountered in determining market prices for work in process and for hundreds or thousands of items of raw material. As already indicated, frequently there is no correlation between changes in prices of raw materials and finished products. The important advantage of the cost or market whichever is lower valuation method is that it is conservative. It is used commonly for valuing inventories of retail establishments, but, while it is more easily applied in such concerns than in manufacturing concerns, it is hard to justify from the point of view of cost accounting because a loss is anticipated and recognized as a charge against operations before the goods are sold.

The replacement cost principle recognizes market prices as the proper valuation basis for inventories and values the goods on hand at the price that would have to be paid for those items on the inventory date. In cases of advancing market prices profits are anticipated and are shown in the accounting records and in statements of profit and loss; in periods of falling prices, estimated losses are reflected in profit or losses. It is not approved for income tax purposes and as yet is not generally accepted by accountants.

The use of the selling price as a valuation method is accepted as sound only in certain cases. Spoiled work, scrap materials, and by-products, where conditions are such as to prevent an accurate determination of cost, may be more easily valued at selling price. A similar valuation problem arises in the case of obsolete materials, when the selling value is decidedly below the original cost. Even under these peculiar circumstances transportation and marketing costs should be deducted in order to obtain a proper inventory valuation.

Methods of Computing Actual Costs. One method of determining actual costs is the specific identification of materials in inventory with the identical cost of those goods as shown by purchase invoices or other detailed cost records. The use of "identical cost" has such a limited application that it is usually necessary to approximate the cost of materials issued and remaining on hand, regardless of the physical flow of goods. The determination of the correct cost of goods is a complex problem unless all goods are bought under long-term contracts at a fixed price. Market prices are subject to constant change, and each invoice received may have a higher or lower price per unit of material than the preceding one.

The alternative methods of computing actual costs are as follows:

a. First-in, first-out method of valuation.
b. Average method.
c. Last-in, first-out method.
d. Standard price method.

The Treasury regulations permit the practice of pricing raw materials into process for tax purposes by the first-in, first-out method, the average method, and the last-in, first-out method of valuation.

First-in, First-out (Fifo) Method. The first-in, first-out method of material pricing, frequently termed the "recent purchase" method, is used most successfully for stockrooms handling items of some bulk with a relatively high unit cost, since it is easy to identify units belonging to a particular lot.

When the first-in, first-out method is used, it is assumed that materials are issued from the oldest supply in stock and that units issued are priced at the oldest cost price listed on the stock ledger sheets, the materials on hand at all times being the most recent purchases. When a requisition for a certain type of material is presented to the stockkeeper or stock ledger clerk, he uses the cost price of the first lot of material received which is still on hand. If the quantity desired is greater in amount than the units remaining in the first lot, he uses the cost price of the second lot, then of the third and fourth until enough material is obtained to fill the requisition. The actual physical handling of materials in bins and on shelves in accordance with the first-in, first-out method is imaginary in most concerns, but it is the method of handling which should be followed in case of materials which are subject to deterioration and obsolescence. Regardless of the manner of physical arrangement that is allowed, the stock ledger sheet and material requisition pricing according to the first-in, first-out method can be used.

Average Method. An average method can be used to good advantage when market prices are subject to constant changes, when the materials consist largely of small items issued in small quantities, or when materials consist largely of fungible goods found in petroleum, mining, and food-processing industries, where there is a commingling of commodities. In periods of rapidly increasing or decreasing material costs, an average cost tends to narrow the extreme prices; the trend upward or downward is more gradual, as contrasted with a stairstep type of increase or decline when prices are taken from the actual invoices under the first-in, first-out method.

Last-in, First-out (Lifo) Method. The last-in, first-out method, which is frequently known as the "replacement cost" method receives its support from the theory that goods sold are those most recently purchased, that goods are issued from stock in accordance with the last-in, first-out plan. The cost of the last lot of materials received is used to price requisitions until that consignment is exhausted; then the next lot pricing is used, and so on through successive lots. Materials are issued at costs approximating current market prices, but inventories tend to be costed at the values of the oldest lots on hand, giving a pricing which may be out of date with current invoice prices.

The last-in, first-out method has been approved for Federal income tax purposes since 1939. If this method is elected, the taxpayer must adhere to it in all subsequent taxable years unless special authorization is obtained from the Commissioner of Internal Revenue.

The last-in, first-out method is an outgrowth of the *normal base stock method*, which, although used in a few extractive industries, has never been permitted for income tax purposes. It is contended by those favoring this method that many enterprises maintain at all times a minimum inventory quantity which can be compared to an investment fund or a fixed asset. If this inventory quantity remains unchanged, it is contended that it should be valued at the cost of the quantity originally purchased and, since sales or production result from current purchases, a better matching of cost of goods sold and sales is obtained if the cost of goods sold represents current cost prices. Thus the prime purpose is to apply current costs to current sales.

The use of the last-in, first-out method tends to level or equalize profits and losses during successive periods of rising and falling prices; it decreases the profit figure during periods of rising prices and increases profits during periods of falling prices. It is favored frequently because it results in reducing income taxes during a period of rising prices. If tax rates remain uniform and are not progressive, the result is a change in the period of taxation rather than a saving. However, if the enterprise is a single proprietorship or a partnership with the owners subject to progressive tax rates or if individual and corporation tax rates are reduced during the downward swing of prices, there will be an actual savings in income taxes.

The last-in, first-out method produces balance sheet figures that are out of date when compared with present costs but may be considered to result in an up-to-date Profit and Loss statement. Accountants favoring the method conclude that management receives a more accurate presentation of profits or losses when there is a correlation of current costs and sales, the trend of costs and selling prices is more apparent, and the statements show the results of operations, excluding profits or losses due to changing price levels.

Standard Price Method. In many manufacturing concerns it has been found advantageous to have standard prices for materials in effect for a definite period of time, perhaps for a year. An investigation of contracts for the purchase of materials, price lists, and market conditions is made in advance of the accounting period, and a standard price is established for each class of material. Stockkeepers are supplied with a list of standard material prices which is used to enter all materials received and to price material requisitioned from stockrooms. Thus both stockkeepers and departmental executives become familiar with established prices for materials, a familiarity which results in fewer complications and in lessened clerical work accompanying the receipt of materials at varying invoice prices. A detailed discussion of standard material costs and of the accounting treatment is given in Chap. XVII dealing with standard costs.

INVENTORY SYSTEMS

Periodic Inventory System. This system provides for the recording of purchases, purchase returns, and purchase allowances on a daily basis but does not provide for a continuous inventory or for a daily computation of the cost of goods sold. At the end of each accounting period a physical count is made of the quantity of goods on hand, and the value of the inventory is determined. The cost of goods sold is obtained by adding the inventory at the beginning of the period to the purchases made during the period and subtracting the inventory value at the end of the period. It is assumed that goods not on hand at the end of the period have been sold. There is no accounting for shrinkage, losses, theft, and waste.

Periodic Inventory System Illustrated. After a physical count of the goods on hand at the end of an accounting period has been completed, it is necessary to choose one of three methods of computing actual cost in order to determine the value of the inventory.

The selection of method will have an effect on the inventory valuation and on the profit or loss for the period as different results are obtained by the use of the different methods.

When the first-in, first-out method is used in determining the value of a periodic inventory, the cost of the inventory is obtained by working backward through the purchase orders or invoices until a sufficient quantity is obtained to cover the inventory at the end of the period. When the average-cost method is employed, the procedure consists of adding together the number of units in the beginning inventory and all units purchased during the accounting period; adding together the total value of the beginning inventory and the cost of all units purchased during the period; dividing the total cost of all units by the total quantity of units; and multiplying the number of units on hand at the end of the period by the average cost per unit obtained by the division. When the last-in, first-out method is used, the procedure is to start with the beginning inventory and work forward through the purchase orders or invoices until a sufficient number of units has been obtained to cover the final physical inventory.

The following problem and its solution illustrate the methods of computing inventory value when the periodic inventory plan is followed.

Illustrative Problem

The Scott City Grain Co. does not maintain a perpetual inventory of wheat which it buys and sells. The physical inventory taken June 30 shows the following quantity of wheat on hand: 1,000 bu. @ $2.28 per bu.

The following purchases were made during July:

July 1	14,000 bu.	@ $2.30	per bu.
7	10,000 bu.	@ 2.32	per bu.
9	20,000 bu.	@ 2.33	per bu.
25	5,000 bu.	@ 2.35	per bu.

July 31, a physical inventory indicates that there are 10,000 bu. of wheat on hand.

a. Compute the inventory value on July 31, by the first-in, first-out method.
b. Compute the inventory value on July 31, by the average-cost method.
c. Compute the inventory value on July 31, by the last-in, first-out method.

Solution

a. FIRST-IN, FIRST-OUT METHOD

July 25	5,000 bu.	@ $2.35	= $11,750	
9	5,000 bu.	@ 2.33	= 11,650	
31	10,000 bu.		$23,400	Inventory

b. AVERAGE-COST METHOD

June 30	1,000 bu.	@ $2.28	= $ 2,280
July 1	14,000 bu.	@ 2.30	= 32,200
7	10,000 bu.	@ 2.32	= 23,200
9	20,000 bu.	@ 2.33	= 46,600
25	5,000 bu.	@ 2.35	= 11,750
Total	50,000 bu.		$116,030

$116,030 ÷ 50,000 bu. = $2.3206 average cost per bushel
July 31: 10,000 bu. @ $2.3206 = $23,206 Inventory

c. LAST-IN, FIRST-OUT METHOD

June 30	1,000 bu.	@ $2.28	= $ 2,280	
July 1	9,000 bu.	@ 2.30	= 20,700	
31	10,000 bu.		$22,980	Inventory

Perpetual Inventory System. The complete control of materials and supplies requires the use of perpetual inventory. The program provides for one or more control accounts in the general ledger supported by a subsidiary ledger composed of stock ledger sheets or cards containing a complete record of materials received, issued to production or service departments, returned to stock or to the vendor, and the daily balances of inventory on hand. In this text the control account is termed Materials Control and the subsidiary record is described as the stock ledger.

Perpetual Inventory Records Illustrated. The technical features of maintaining stock ledgers are illustrated in the following problem and its solution, in which the first-in, first-out, average-cost, and last-in, first-out methods of costing are shown in detail.

Illustrative Problem

July	1	Balance, 100 units @ 10¢ per unit, $10.
	1	Ordered 400 units, purchase order 5; expected July 6.
	2	Issued 25 units, requisition 100, Dept. A.
	4	Ordered, 200 units, purchase order 10; expected July 8.
	6	Received, 400 units, purchase order 5 @ 11¢ per unit.
	7	Issued, 150 units, requisition 102, production order 201.
	8	Returned to stockroom 10 units from Dept. A, requisition 100.
	10	Received, 150 units, purchase order 10 @ 12¢ per unit.
	12	Ordered, 100 units, purchase order 15; expected July 20.
	15	Issued 160 units, requisition 125, production order No. 210.
	18	Received 50 units, balance of purchase order 10 @ 12¢ per unit.
	21	Issued 60 units, requisition 130, Dept. B.
	23	Returned to vendor, 20 units from purchase order No. 10, received July 18.
	25	Received, 100 units, purchase order 15 @ 10¢ per unit.
	27	Freight on purchase order 15, $2.50.
	29	Issued 125 units, requisition 140, production order 250.

Enter the above transactions in the stock ledger account for material Y, using

a. The first-in, first-out method.
b. The average-cost method.
c. The last-in, first-out method.

Solution

The stock ledger sheet, illustrating the first-in, first-out method is presented as Exhibit 21. The stock ledger sheet, Exhibit 22, presents the same transactions in accordance with the average-cost method, and Exhibit 23 illustrates the costing of the transactions by the last-in, first-out method.

It will be noted that the 10 units returned to the stockroom from Dept. A, requisition 100, on July 8 were entered in each of the three ledger sheets in the Issued section in red, but the costing of the returned units when reissued differs with the pricing method used. In case the first-in, first-out method is employed, the returned material is recorded at the price at which it was originally issued, the quantity and price are shown in the Balance section, and these units are issued at the old price on the next requisition received. In the ledger sheet, exhibiting the average-cost method, the unused materials are shown at the price originally issued, but it is necessary to compute a new average cost as if the goods returned were a new purchase. In the ledger sheet illustrating the last-in, first-out method, the returned units are treated in the same manner as they are in the case of the first-in, first-out method, *i.e.*, the returned goods are priced as originally issued and reissued at the same price on the next requi-

EXHIBIT 21
FIRST-IN, FIRST-OUT METHOD
Stock Ledger Sheet

Material Y

Ordered				Received					Issued						Balance		
Date	Purchase order No.	Quantity	Date expected	Date	Purchase order No.	Quantity	Unit cost	Total cost	Date	Requisition No.	Dept. or production order No.	Quantity	Unit cost	Total cost	Quantity on hand	Unit cost	Total cost
7/1	5	400	7/6												100	$0.10	$10.00
									7/2	100	D-A	25	$0.10	$ 2.50	75	0.10	7.50
7/4	10	200	7/8														
				7/6	5	400	$0.11	$44.00							75	0.10	
															400	0.11	51.50
									7/7	102	P-201	75	0.10				
												75	0.11	15.75	325	0.11	35.75
									7/8*		Returned	10	0.10	1.00	10	0.10	
															325	0.11	36.75
				7/10	10	150	0.12	18.00							10	0.10	
															325	0.11	
															150	0.12	54.75
7/12	15	100	7/20														
									7/15	125	P-210	10	0.10				
												150	0.11	17.50	175	0.11	
															150	0.12	37.25
				7/18	10	50	0.12	6.00							175	0.11	
															200	0.12	43.25
									7/21	130	D-B	60	0.11	6.60	115	0.11	
															200	0.12	36.65
				7/23*	Ret'd to vendor	20	0.11†	2.20							95	0.11	
															200	0.12	34.45
				7/25	15	100	0.125	12.50							95	0.11	
															200	0.12	
															100	0.125	46.95
									7/29	140	P-250	95	0.11				
												30	0.12	14.05	170	0.12	
															100	0.125	32.90

* In red.

† Units returned to vendor valued as oldest goods in present inventory.

Material Y

EXHIBIT 22
AVERAGE-COST METHOD
Stock Ledger Sheet

Ordered				Received					Issued						Balance		
Date	Purchase order No.	Quantity	Date expected	Date	Purchase order No.	Quantity	Unit cost	Total cost	Date	Requisition No.	Dept. or production order No.	Quantity	Unit cost	Total cost	Quantity on hand	Unit cost	Total cost
7/1	5	400	7/6												100	$0.10	$10.00
									7/2	100	D-A	25	$0.10	$ 2.50	75	0.10	7.50
7/4	10	200	7/8														
				7/6	5	400	$0.11	$44.00							475	0.1084	51.50
									7/7	102	P-201	150	0.1084	16.26	325	0.1084	35.24
									7/8*		Returned	10	0.10	1.00	335	0.10818	36.24
				7/10	10	150	0.12	18.00							485	0.11184	54.24
7/12	15	100	7/20														
									7/15	125	P-210	160	0.11184	17.89	325	0.11185	36.35
				7/18	10	50	0.12	6.00							375	0.11292	42.35
									7/21	130	D-B	60	0.11293	6.78	315	0.11292	35.57
				7/23*	Ret'd to vendor	20	0.11292†	2.26							295	0.11292	33.31
				7/25	15	100	0.125	12.50							395	0.11597	45.81
									7/29	140	P-250	125	0.11597	14.50	270	0.11597	31.31

* In red.

† Units returned to vendor valued at latest average cost.

EXHIBIT 23
LAST-IN, FIRST-OUT METHOD
Stock Ledger Sheet

Material Y

Ordered				Received					Issued						Balance		
Date	Purchase order No.	Quantity	Date expected	Date	Purchase order No.	Quantity	Unit cost	Total cost	Date	Requisition No.	Dept. or production order No.	Quantity	Unit cost	Total cost	Quantity on hand	Unit cost	Total cost
7/1	5	400	7/16												100	$0.10	$10.00
									7/2	100	D-A	25	$0.10	$ 2.50	75	0.10	7.50
7/4	10	200	7/8														
				7/6	5	400	$0.11	$44.00							75 400	0.10 0.11	51.50
									7/7	102	P-201	150	0.11	16.50	75 250	0.10 0.11	35.00
									7/8*		Returned	10	0.10	1.00	75 250 10	0.10 0.11 0.10	36.00
				7/10	10	150	0.12	18.00							75 250 10 150	0.10 0.11 0.10 0.12	54.00
7/12	15	100	7/20														
									7/15	125	P-210	10 150	0.10 0.12	19.00	75 250	0.10 0.11	35.00
				7/18	10	50	0.12	6.00							75 250 50	0.10 0.11 0.12	41.00
									7/21	130	D-B	50 10	0.12 0.11	7.10	75 240	0.10 0.11	33.90
				7/23*	Ret'd to vendor 15	20	0.11†	2.20							75 220	0.10 0.11	31.70
				7/25		100	0.125	12.50							75 220 100	0.10 0.11 0.125	44.20
									7/29	140	P-250	100 25	0.125 0.11	15.25			
									7/31						75 195	0.10 0.11	28.95

* In red.

† Units returned to vendor priced for last units received and in stock.

sition received. The last-in, first-out principle is used in both the first and the third cases; in the case of the first-in, first-out method, the returned units are reissued under the last-in, first-out principle as a matter of convenience and simplification.

The return of goods from the stockroom to the vendor, as exemplified by the transaction dated July 23, raises the practical problem of what pricing should be used. In this problem, under the first-in, first-out method, the goods returned to the vendor are priced at $0.11 per unit, which represents the price of the oldest goods in the inventory at this date; in the case of the average-cost method, the units are returned to the vendor at $0.11292 which is the latest average price; in connection with the last-in, first-out plan of costing, the units are returned to the vendor at $0.11, the last units received and still in stock.

Accounting for Materials Returned to Vendor. The pricing of goods returned to the vendor at a figure different from that originally recorded for these units in the stock ledger sheets is in each case a matter of convenience and consistency rather than an attempt to record the amount to be obtained as an adjustment from the supplier. It must be remembered that, in the majority of concerns, the amounts recorded in the individual stock records do not represent the invoice price. The invoice prices are adjusted for discounts, freight-in, receiving, and handling costs so that even though the original cost figures recorded in the stock ledger sheets for returned goods were used, they would seldom be identical with the price per unit granted by the vendors. Therefore, it is necessary to use an adjustment account to absorb the variances.

If the voucher register columns have been posted for the month, the following entry should be made in the general journal for the return of the goods to the vendor:

Vouchers Payable..................................	xxx	
Inventory Adjustment.............................	xxx	
Materials Control..		xxx

If the voucher register columns have not been posted, the value of the returned goods may be entered in red in both the Vouchers Payable column and the Materials Control column with an entry to the Inventory Adjustment account being inserted in the Sundry column.

The entry in the subsidiary stock ledger sheet for the material returned to the vendor may be priced as if it were a routine issue on a material requisition. Clerical procedures are simplified if first-in, first-out, average, or last-in, first-out methods are consistently observed for both goods issued from stock and materials returned to vendors.

Pricing of Materials Returned to Stockroom. When materials are returned from requisitioning departments to the stockroom for credit, the problem arises as to the proper method of handling such returns in stock ledger sheets. One plan is to consider the material returned at the price it was issued originally, to keep it in suspense by a special marking or symbol, and to issue it at the old price on the next requisition which is received. A second plan is to treat the returned units as if they were a new purchase, to retain the original pricing, but to give the material a position after the last purchase received. If the second plan is used with the average method, the unused materials returned to the stockroom are entered in the Received section of the stock ledger sheets at the price originally issued, and a new average cost per unit must be computed.

PHYSICAL INVENTORY OF MATERIALS

Even if perpetual inventory records are maintained, it is advisable to take a physical inventory of material and supplies at least once a year. An actual count and appraisal are necessary in order to check the accuracy of the perpetual inventory records and to segregate materials which are obsolete or in a deteriorated condition. Two general methods for taking physical inventories are in use. One consists of a continuous physical inventory, and the other of the periodic physical inventory which consists of an actual count made at the close of each fiscal period or at regular intervals of the year.

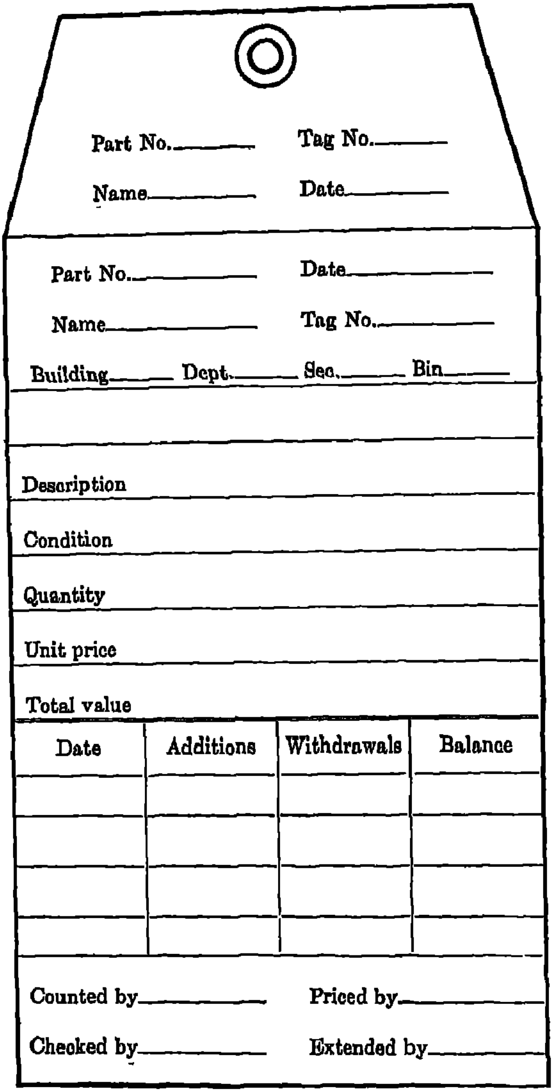
The continuous physical inventory method is adaptable in large concerns which can afford to maintain a trained staff to take inventory throughout the year. The plan has the advantage of not requiring a shutdown of business operations or the employment of untrained employees in inventory operations. It has the added advantage of encouraging stockkeepers and clerks to have their stock of materials and records in order and up to date at all times in anticipation of the unexpected arrival of the inventory staff. The frequency of the inventory taking in a given stockroom or department depends upon the type of materials and the record of efficiency of a given division. Departments or stockrooms storing materials subject to waste or obsolescence may be inventoried as frequently as once or twice a month, while other divisions may be checked only two or three times a year. When such a system is in force, adjustments to inventory records for errors, shortages, or changes in values are made at the completion of the inventory in each division. When perpetual inventory records are checked by an efficient system of continuous inventory taking, the perpetual inventory records generally are considered true balance sheet cost values by public accountants, banks, and credit agencies.

Periodic Physical Inventories. In some business concerns, the annual taking of inventory is an unsystematic process without carefully prepared plans or the services of a trained staff, with the result that inaccurate, unreliable inventory figures are frequently derived. The method of taking inventory varies with the size and type of business enterprise; hence only a general program can be outlined.

Modern inventory methods include the thorough advance planning of inventory taking and the training of a staff of inventory takers. The actual counting of units should be completed within as short a period as possible, so that merchandising or production activities will be disrupted no longer than is absolutely necessary. For this reason it is advantageous to take inventory during a period of slack business activity whenever possible. Printed instructions for inventory are prepared by the comptroller, auditor, or inventory committee, and the instructions and plans are discussed by executives with the inventory staff in advance. The inventory staff is usually composed of counters, who are foremen, stockkeepers, or workmen familiar with various classes of materials and capable of counting pieces quickly and accurately, and of writers, usually clerks, who are able to write legibly and accurately. Department heads and stockkeepers are given instructions to have their divisions in order with materials arranged so as to be easily counted. The use of a tag system is the most common arrangement for recording units counted, because a copy of the tag can be attached to the material as evidence that it has been inventoried and tags can be classified into proper groups for pricing purposes. The tag is generally arranged so that the top section can be fastened to bins, shelves, or piles of material and the bottom part torn off to constitute the inventory record, but it may be prepared with an original and duplicate copy. An example of an inventory tag is given in Exhibit 24. Sections are included for additions and withdrawals so that units of material added or issued during inventory taking can be accounted for.

In organizing the personnel for taking inventory, supervisors are appointed from the foremen or executive group to be in charge of a number of stockrooms or departments; counters and writers are paired and are assigned in blocks to supervisors who, in turn, allot series of numbers to writers. Each pile of material, bin, and shelf is counted by the counter, who gives the name or number of material, quantity, and condition to the writer so that the information can be inserted on a tag. In some cases the names or code numbers of the material are entered on the tags by stockkeepers or by the material accounting department before the inventory is taken. At the completion of the counting of each group of material, a tag prepared by the writer is attached to each bin or shelf by a string or weighted down by a piece of material. If the duplicate tag method is used, both the original and carbon are attached; if the single tag method is used, both sections of the tag are attached. The supervisor for each inventory area samples the work done by the counters and writers under his supervision, and, when a department or stockroom is completed, he inspects all classes of material to see that a tag is attached to each. When he is satisfied that the work is efficiently done and that all materials have been included, he gives the order to detach the original tag or the bottom section of the single tag, leaving either the duplicate or the upper section of the single tag as evidence that the material has been inventoried. The detached tags are sorted by classes of material and by departments and are sent to the purchasing or accounting department for proper pricing.

Pricing, Extending, and Summarizing Inventory Tags. After inventory tags are classified by departments and by types of material, they are transcribed on inventory sheets. If perpetual inventory records are maintained, unit and total costs are inserted on inventory sheets from



Part No.______ Tag No.______

Name______ Date______

Part No.______ Date______

Name______ Tag No.______

Building______ Dept.______ Sec.______ Bin______

Description

Condition

Quantity

Unit price

Total value

Date	Additions	Withdrawals	Balance

Counted by______ Priced by______

Checked by______ Extended by______

Exhibit 24. Inventory tag.

stock ledger sheets in accordance with the policy of the company. If no perpetual inventory records are in use, pricings are obtained from invoices or from corrected purchase orders. If the concern uses the cost or market whichever is lower basis of inventory valuation, market prices, as well as cost, are obtained for each class of material and are recorded on the inventory sheets.

The next problem is extending, tabulating, and summarizing the inventory in terms of dollars. The work may be done by machine operators in the concern, or the inventory records may be sent to establishments specializing in tabulation operations.

Adjusting Perpetual Inventory Records. When the physical inventory of materials is completed and compared with the balances shown on stock ledger sheets, variances necessitating adjusting entries may be noted. If the balances in stock ledger accounts show a greater quantity on hand than the actual count, the following entry is made in the general journal:

Inventory Adjustment	xxx	
Materials Control		xxx

In each appropriate stock ledger account an entry for both quantity and value is recorded in the Issued section and a reduction is made in the Balance section. When the inventory is taken, if the balance in a stock ledger account is less than the actual count, the following journal entry is necessary:

Materials Control	xxx	
Inventory Adjustment		xxx

The Inventory Adjustment account is a controlling account which is supported by an analysis sheet listing the adjustments to stock ledger accounts and showing the nature of each. The disposition of the Inventory Adjustment account depends upon the policy of the company regarding variances. If an analysis reveals that a portion of the amount in the Inventory Adjustment account is a loss or gain in inventory values due to circumstances which are normal and to be expected in the ordinary course of business operations, then a closing entry can be made debiting or crediting Overhead Control with a corresponding credit or debit to the Inventory Adjustment account. If all or a portion of the discrepancy is a loss due to abnormal circumstances not covered by insurance, such as fire, water damage, theft, or sabotage, the proper treatment at the end of the accounting period is to close the Inventory Adjustment account to Profit and Loss or Earned Surplus, depending upon the company's policy regarding the treatment of abnormal losses.

CHAPTER V

CONTROL OF LABOR COSTS

Proper control and accounting for labor costs constitutes one of the most important problems of management in the operation of a business enterprise and in the determination of the cost to manufacture and to sell a product or service. Accountants have long recognized the importance of adequate systems of controlling and recording payroll costs, yet, because of the cost and trouble involved, many businessmen have been tardy in the establishment of efficient policies and plans. In fact, the enactment of the Federal Social Security Act in 1935 is largely responsible for the management of large and small business enterprises alike reviewing their methods of accounting for labor time and costs and installing more complete personnel and labor cost records.

Problems in connection with payroll control and accounting are so closely interwoven with personnel policies and Federal and state government tax requirements and reports that no divorcement is possible.

Various types of payroll and employee records are maintained by such departments as:

a. The personnel department.
b. The engineering department.
c. The rate or time and motion study department.
d. The timekeeping department.
e. The cost accounting department.
f. The payroll department.

The type of employee records and the responsibilities of the foregoing departments in controlling labor costs are described in the present chapter. The accounting procedures for the control of labor costs and the accounting requirements of the Social Security Program are discussed in the following chapter. Although the personnel problems and detailed accounting methods vary with the type of business enterprise, the general procedures described are illustrative of the general methods employed.

Personnel Department. The personnel director, with the aid of various department supervisors and major executives, is responsible for the execution of policies regarding the employment, discharge, classification of employees, wages, and wage systems which have been predetermined by the board of directors and/or a committee of executives.

The problems of personnel are not concentrated in the personnel department, nor are they exclusively the responsibility of the personnel director. The proper control of personnel requires the attention of every member of the supervisory force from the chief executive to job foremen. The personnel director is a technical adviser, a specialist, and a correlator; he is acquainted with the labor conditions in the industry, the labor policies of the company, the production program, and the needs and problems of the workers. The personnel department in addition to the director, includes interviewers, clerks, stenographers, and one or more employment managers, each of whom is responsible for separate divisions such as sales, production, and administration.

Exhibit 25

EMPLOYEE PLACEMENT REQUISITION

Requisition No.______________

Date ______________

Report to____________________Department____________________at
Supervisor's name

____________on____________
Time Date

Number of employees requested	Job specification	
	No.	Description

Requisitioned by____________________Approved by____________________

A common procedure used in assigning workers to jobs is described as follows. An employee placement requisition, Exhibit 25, is sent to the personnel department whenever a worker is needed for a particular job. The requisition is prepared by foremen or group leaders and approved by department executives. A file copy is kept at the point of origin, and the copy sent to the personnel department becomes the basis for reassigning a present employee or for hiring a new worker.

It is a task of the personnel department to interview applicants for positions and to receive formal applications. The application for employment is a record of information about the applicant based upon informational requirements of Federal and state social security laws and requirements of the company. As an aid in selecting personnel the forms are frequently prepared in two copies so that two sets of files of applications can be maintained, one according to alphabet and another according to the firm's classification of labor.

The personnel department should prepare a personnel card or sheet for each worker who is employed. The personnel record contains data regarding the applicant, transcribed from his application blank, and during the period of employment shows the nature of work or positions, wage rates, promotions, or changes in wage classification. The personnel record is a case history which extends from the day a worker is employed until his services are terminated.

An individual compensation record of the time worked, rate of pay, earnings, and deductions for each employee is essential in order to comply with the social security requirements. This record is described in connection with payroll accounting in Chap. VI.

When the services of an employee are terminated, an Employee Termination Report, Exhibit 26, is prepared by his supervisor and approved by the department executive. One copy is kept at the point of origin, the second copy is sent to the payroll department for the preparation of the final pay check, and the third copy is sent directly to the personnel department, where extensions of the final pay are entered on the termination report from information furnished by the payroll department. A copy of the report is then incorporated with the employee's personnel records. An additional protection against the payroll's including employees who have left their jobs may be provided by routing a copy of the Employee Termination Report to the timekeeping department.

Engineering Department. This department maintains control over working conditions and production methods for each job and department or process by performing the following functions:

a. Preparation of plans and specifications for each job scheduled for production.
b. Supervision of production activities within production departments.
c. Inspection of parts and jobs at successive stages of production and at the completion of production.
d. Initiation and supervision of research and experimental work.
e. Safety and efficient working conditions.

Rate or Time and Motion Study Department. This department may be a division of the engineering department, or in some enterprises it may have an independent status. In either case it operates in close harmony with the personnel, engineering, and cost departments. Its chief functions are as follows:

a. Preparation of time and motion studies of labor and plant operations.
b. Setting piece-rates.
c. Making job analyses.

A time study is a measurement of a labor operation by means of an analysis of the various movements and activities composing the task. Time studies are made by specially trained engineers whose observations are usually timed by means of a stop watch. Generally 10 to 12 observations are made of each labor operation and an average time is computed. A standard time represents the time allowed, with consideration being given to absolutely essential labor movements, proper tools, and trained, efficient, and skilled workers. In some enterprises time studies are supplemented with motion studies, which consist of motion pictures of labor operations. The developed pictures are a means of studying operations in order that unnecessary movements may be eliminated and the most efficient methods may be adopted. The films may be run for groups of workmen so that they may pattern their methods in accordance with those used by the most efficient workmen.

Exhibit 26

EMPLOYEE TERMINATION REPORT

Report No.____________

Date ____________

____________________________ ____________
Employee's name Number

Dept.______________________Classification____________

Terminal Wage________Withholding________Refunds________Net Amt.________

Reason for termination______________________________

____

____

Do you recommend this employee be rehired ______ ______
Yes No

Comment______________________________

Prepared by______________ Approved by______________

The standard time for each labor operation is used as a basis for the determination of wage rates in the operation of incentive wage systems, in the preparation of estimates of labor costs, and in the establishment of standards of efficiency. A time-study card showing time allowances in terms of a decimal part of an hour is generally prepared for each labor operation. Time studies are made whenever there is a new labor operation or when there has been a change in machines, in methods of operation, or in types of labor employed. Existing rate schedules should be reinvestigated at frequent intervals by means of time and motion studies to prove their accuracy.

Another important function of the rate department is the preparation of a description and classification of each job, with a list of the qualifications needed by workers to perform the work satisfactorily. In order to secure this information each job is carefully analyzed, its peculiarities noted, and the workmen's training, experience, and skill are studied. Such job analyses permit the personnel department to catalogue its labor requirements and to assign the best available man to each job.

Timekeeping Department. The timekeeping department is usually a decentralized organization with time clerks, who are responsible to the head timekeeper or supervisor, located in the various service and production departments. Although foremen are often too busy with other more important duties to act as timekeepers, frequently they are required to check and initial time reports, which virtually makes them responsible for timekeeping. Timekeeping is generally indirectly under the supervision of the factory or office superintendent and is directly under the supervision of the cost department or payroll department. It is generally more effectively handled when under the direction of the cost accountant since there is an important relationship between time records and the cost accounting system. The paymaster is responsible for timekeeping when the payroll and timekeeping functions are centered in a single department. The timekeeping task consists of obtaining an accurate record of each worker's time in and out of the plant each morning and afternoon during regular working hours and overtime during irregular working periods, and of reporting the time of each employee for each department, operation, and production order.

Different methods of recording employee time in and out of the factory and office are in use. One plan is based upon an "honor system," which requires only that employees record their time on a slip of paper. Tardiness reports are prepared for those who are late for work. When the plan is used in union shops, union representatives may assist the company in any necessary disciplinary action. Apportionment of executive time to departments, processes, or jobs requires time sheets on which each executive may report his allocation of time.

A second plan of time recording consists of using a metal disk which contains an identification number for each employee. A board containing hooks to which employees' disks are attached is located near the entrance to the plant. Upon entering the plant each working period, an employee removes his disk from the board and carries it to a smaller board either adjacent to or in his department, where he hangs it on a hook showing his identification number. Later a representative of the timekeeping department records the numbers of the workers who have appeared for work and transfers the disks to the large board at the entrance where they will be available to workers when they report at the beginning of the next work period. If employees leave the plant before the regular closing time, they must give to watchmen in charge of each exit their names, identification numbers, and reason for leaving.

The most modern type of time recording consists of a mechanical time recording device known as a "time clock" or "time recorder." Each worker is assigned a clock number which is used in identification, in preparing payrolls, and in classifying labor time by departments and by production orders. At the beginning and close of each morning and afternoon a daily time card showing the worker's name, clock number, and department is placed in a rack, located at a convenient distance from the time clock. When an employee arrives or leaves he inserts the card in the time clock device, and the time and date are recorded on the card, which he places in another rack located on the other side of the recorder or in his department. In some concerns the time clock is closed at a specified time and employees who are late must report to the timekeeping department before they are permitted to work; in others, the time clock records the late period in red. According to one plan the time cards are used by the timekeeping department as a posting medium to payroll sheets or to summary time cards and as a means of checking the total time of factory employees. A form of weekly clock card is shown as Exhibit 27. Provision is made for recording time in and out for each day of the week before and after mealtime and for overtime.

In some concerns timekeeping is still performed by regular timekeepers or by foremen or clerks specially commissioned to account for the time of employees. The plan is less efficient than either of the two others because of the human element involved which frequently results in inaccuracies. If the services of regular timekeepers are required, the timekeeping cost is comparatively greater than when time clocks are in use.

The second task of the timekeeping department is to account for the time of each employee in terms of departments, operations, and production orders or jobs. The classification of workers' time may be obtained through the use of the daily time card for each worker. The time card can be prepared to show, in addition to the department, the worker's name, identification number, and the time in and out for the day, the time required for each production order or operation, the total labor time, the wage rate, and the total wage earned for the day. A form of daily time and cost card is shown as Exhibit 28.

The time required for each production order or operation may be

Exhibit 27

WEEKLY CLOCK CARD

Pay ending________________

No.______________

Name____

Department____________________

DAY	IN	OUT	IN	OUT	IN	OUT	

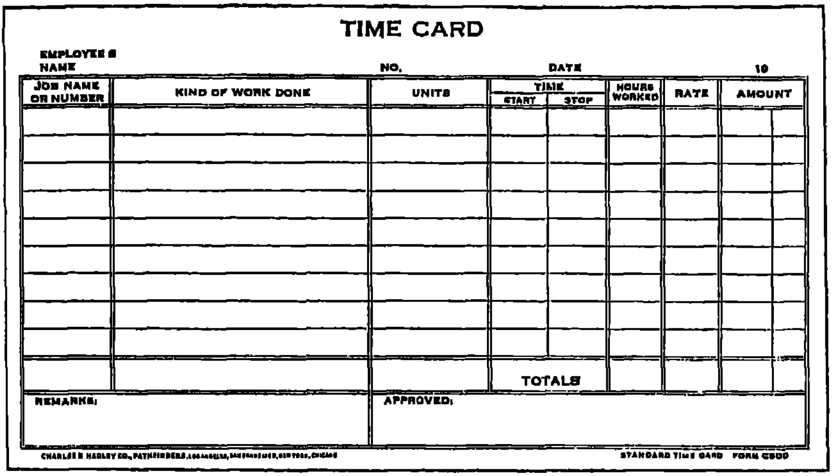
WITHHOLDINGS	Hours______@_________Amount______________
F.I.C.A.__________	______ _________ ______________
Income Tax________	Total wage______________
__________________	Total withholdings______________
__________________	
Total $____________	Net pay $______________

recorded mechanically by the employee who inserts his time card in an electric job time recorder when he starts and completes each assignment; or, if a time recorder is not used, the recording of time may be done by a timekeeper, by a foreman, or by the worker himself. The recording of the time by the job time recorder and by a regular timekeeper are the most satisfactory methods. Foremen have other duties to occupy their time, and workmen frequently are careless or negligent in charging their time to operations or jobs. Labor time must be properly classified and accurately recorded in order that the labor cost data prepared by the cost accounting department may be of value to management.

Cost Accounting Department. The cost accounting department is responsible for the accumulation and classification of all cost data of which labor costs is one of the most important elements. In some enterprises cost accounting activities are decentralized and the cost accountant acts largely in the capacity of an organizer and director in the accumulation of payroll information and labor costs. The cost accountant supervises the work performed in the various departments and uses the summarized time tickets and payroll information in his computation of costs of production or services by departments, operations, production orders, and territories. Frequently representatives of the cost accounting department are located in large production departments to aid in accumulating and classifying labor costs.

Exhibit 28

Daily Time and Cost Card



TIME CARD

EMPLOYEE'S NAME — NO. — DATE — 19

JOB NAME OR NUMBER	KIND OF WORK DONE	UNITS	TIME		HOURS WORKED	RATE	AMOUNT	
			START	STOP				
			TOTALS					

REMARKS:

APPROVED:

In other concerns the activities of the cost department are highly centralized, and cost analyses and reports of labor costs are prepared from original or duplicate copies of time cards. The cost department has a close relationship to, and an active interest in, the activities of the timekeeping department. The timekeeping department sends either the original or duplicate copies of daily time tickets to the cost department where they are costed and checked as to total time in the factory as well as labor distribution.

In most cases it is customary to analyze the total labor time into direct and indirect labor by departments or processes. Direct labor may be subdivided into piecework, group work, day work, overtime, bonus, or premium and in manufacturing concerns is chargeable to production directly. Indirect labor may be classified by the same types of compensation but is treated as overhead; it is charged to production by means of overhead application rates. The direct labor hours or direct labor costs, recorded on daily time cards, are generally used in factory cost accounting as a basis for the application of factory overhead to production orders.

The cost department is responsible for analyzing the payroll in order to render routine and special labor cost reports revealing the amount of normal and abnormal idle time, direct labor, indirect labor, overtime, departmental labor costs, and variances from budgeted or planned labor costs to inform management of the effectiveness of its labor policies and to permit necessary action to be taken to retain proper control of labor costs.

Payroll Department. The important responsibilities of the payroll department in controlling and accounting for labor costs may be listed as follows:

a. To maintain a record of the job classification, department, and wage rate for each employee.

b. To verify and to summarize the time of each worker as shown on the daily time cards.

c. To compute the wages earned by each worker.

d. To prepare the payroll for each department showing the total amount earned for the period by each employee.

e. To compute the payroll deductions required by the Federal Social Security Act, state unemployment compensation laws, and Federal Internal Revenue Code.

f. To compute the payroll deductions authorized by the employee for union dues, credit union, charitable donations, savings bonds, and health and accident insurance.

g. To maintain a permanent payroll record for each employee.

h. To disburse salary and wage payments.

Time cards are the basis for the preparation of payrolls. Departmental payroll sheets, which constitute the recapitulation of data appearing on daily or weekly time reports, are summarized in a master payroll sheet which forms the basis for the preparation of the payroll voucher entry and the posting to cost controlling accounts in the general ledger.

In many organizations the preparation of payrolls and the payment of workers are planned so that the payroll department may "stagger" its activities. Thus one department or division may close its week on Monday and employees may be paid Wednesday; a second department may close its week on Tuesday and payments may be made Thursday; and so on through the week so that there is an even flow of payroll work. The method of payment varies with the business organization. In some concerns paymasters actually pay employees while they are at work; in other enterprises pay windows or pay booths are arranged conveniently. Payment of wages by check is a satisfactory means of payment because the payroll department is not concerned with handling large sums of money and making change; likewise the canceled checks serve as receipts. When workers are paid with cash, a pay envelope, containing a detachable section, is generally used. Employees sign the perforated section of the pay envelope and give it to the paymaster as a receipt. In other concerns employees sign a payroll sheet or a receipt card when they receive their compensation.

In order to maintain a control to safeguard the payroll against the inclusion of names of fictitious employees or the names of employees who have previously left their jobs, the paymaster should require the identity of each worker at the time of payment of wages by one of the following:

a. Personal identification by foreman or union steward.
b. Signed receipt for comparison with a personal signature on file in personnel department.
c. Identification card or badge.

WAGE SYSTEMS

An important aspect of labor cost control is a wage system designed primarily and fundamentally to give management control over labor before costs are incurred. The following objectives should be considered in the selection of a wage system:

a. Acceptance by employees to avert slowdowns and work stoppages.
b. Provision for flexibility.
c. Provision for economy in administration.
d. Supplying of labor statistics for use in industrial relations and for trade associations, governmental agencies, and competitors.
e. Stabilization of labor turnover.
f. Minimizing of absenteeism.
g. Provision for incentive plans.

Personnel Policies in Regard to Incentives and Compensation Plans. With the cooperation of the personnel director and his staff, it is a function of management to formulate, initiate, and operate a system of wage-payment plans which will stimulate production and sales, encourage efficiency and economy, and promote good will and satisfaction among workers. Workers are more responsive and productive when some form of incentive is offered to them for surpassing specified standards of perfection and performance. Incentives offered are generally financial in character, although nonfinancial forms are often used to reward indirect workers such as clerks, stenographers, supervisors, foremen, and salesmen. Forms of nonfinancial incentives include prizes, medals, distinguished service badges, longer vacation time, vacation trips with expenses paid, and promotion to more responsible and remunerative positions. Recognition of meritorious service in the form of public or group reports, such as tabulation of costs, production and sales statistics on charts, on blackboards, or in bulletins, may also be classed as nonfinancial incentives.

Financial incentives, which have received greater consideration and have been more generally applied to the rank and file of workers than have nonfinancial incentives, include any form of compensation that is dependent upon the productivity and efficiency of a worker, executive, or group of workers. They may be applied to any level of the personnel from major executives to the lowest paid worker. Executives frequently are paid regular salaries and bonuses contingent upon sales or production for a specified period, or they are permitted to share in net profits in addition to the regular salary schedule. Minor executives, sales and production supervisors, foremen, and job foremen are rewarded for large sales or production volume, for equaling or surpassing overhead cost budget allotments, or for effecting economies in sales or in production methods by bonuses computed as a percentage of the volume of activity or of savings. Factory and office workers are generally paid in accordance with their productivity in the form of piecework rates of which there are numerous types.

Financial incentives are an important aid to management in the reduction of both labor and overhead costs. Labor costs per unit of production are decreased by increasing the output of each worker or machine. Likewise, since overhead costs, comprised largely of such items as depreciation, rent, taxes, insurance, heat, and supervision, accrue on the basis of time, an increase in production in terms of units by means of incentive wage plans will result in overhead costs per unit of output being reduced.

Employees also are benefited by the operation of incentive plans. The majority of workers prefer to receive compensation commensurate with their productivity because the most efficient workers receive benefit from their initiative, skill, and training. In order that a compensation plan may be successfully employed, it must be fair both to the employees and to the business enterprise.

Wage-payment Plans. There are so many different types of wage-payment plans in use at the present time that only the general characteristics of the more common types are described. The best known wage systems include:

a. Straight-time (day wage or salaries).
b. Piece-rates.

Straight-time Plans. Although various wage incentive plans are gradually replacing time wages, the straight-time wage persists as the most common form of payment in present use. It provides for the payment of a specified amount per hour, day, week, or month regardless of the amount or quality of the work. When workers are required to work additional hours or days beyond the specified time requirement, generally it is customary for employees to receive compensation at the same rate or at a higher rate for the overtime period.

From the point of view of the worker, the straight-time method has both advantages and disadvantages. There exist the elements of security and certainty which appeal to many workers. Workers can depend upon a definite wage or salary regardless of the amount of work completed or the efficiency of their work, so long as it is above the minimum requirements expected of employees. On the other hand, the method does not give proper recognition or reward to exceptionally industrious and efficient workers whose productivity is above the average of the group. Since a worker receives the same wage whether he is the most productive or least productive of his class, there is little incentive to achieve superior performance. It is true that opportunities for promotion to executive positions or to a higher classification of workers or the fear of discharge may be forms of incentives, but generally they are so remote that their effect on workers is not a positive one.

From the point of view of the employer straight-time wage plans have the advantage of simplicity and economy in timekeeping and payroll recording. There are no complications of a mathematical character and no counting, weighing, and testing of each worker's output as is required in incentive wage plans. Likewise, in industries in which craftsmanship and skill are important, workers may complete their tasks without the pressure of quantity production methods or the thought that their compensation is dependent upon volume of output. On the other hand, it is estimated that employees work at from 50 to 60 per cent of their possible capacity when they are employed on a straight-time basis. There is no provision to encourage workers to speed up production so that the enterprise will receive the maximum benefits from each employee's activities. When incentives and means of measuring the productivity of workers are lacking, there must be substituted a more complete system of supervision and control of labor operations. Consequently, straight-time wage plans generally result in a higher labor cost as compared with the results of well-planned and efficiently operated incentive wage schemes.

The average and below-average workers favor the straight-time wage plan, while the above-average or exceptional workers favor wage systems which provide for compensation in proportion to the amount of work completed. The straight-time plans are favored by labor unions because standardized wage rates aid in collective bargaining and in negotiations with employers.

The straight-time wage is still the most effective plan for workers such as clerks, accountants, stenographers, factory helpers, members of the supervisory staff and officers whose work cannot be standardized and measured satisfactorily, and highly skilled and efficient workers with whom the quality of work is a more important factor than volume of production.

Piece-rates. Compensation plans based on the number of pieces or the quantity of production is a common form of wage payment for direct workers. The total earnings, above a legal minimum, may be entirely dependent upon the work completed, or provision may be made for a minimum base wage or guarantee to protect workers who, during their apprenticeship or the periods of slack production or breakdown of machinery, are in no way responsible for their inability to earn a living wage.

Straight piece-rates have an important advantage of simplicity. The total wage is determined by counting or weighing each worker's production and multiplying the total by the piece-rate. It is a method which is easily understood and verified by workers, who are paid in accordance with their productivity. Employees of superior ability and training are encouraged to increase their productivity and total compensation, with benefits reacting both to the individual worker and to the business enterprise. A competitive situation usually develops among workers in each group, and the few energetic and highly efficient workers tend to stimulate increased activity and to raise the standard performance of the group.

Piece-rates are of advantage to management in the following respects:

a. A reduction in the need for managerial supervision, since each worker assumes responsibility for his own time and output.

b. A lowering of overhead costs per unit of production, because of the increased volume of production.

c. The computation of labor costs in advance of production is made possible, since the fixed rate per unit or job has been determined.

d. Personnel control is aided by the isolation of submarginal employees whose work is inefficient and below the minimum standard requirements of the enterprise.

The use of piece-rates is by no means a perfect wage plan. It tends to emphasize quantity rather than quality and requires minute inspection of finished products. Generally the amount of imperfections, spoiled work, and defective parts is increased and higher depreciation costs result from the fact that machinery and equipment are subjected to greater wear and tear. Frequently workers are laid off or their compensation is reduced due to lack of work, repairs of machinery, and breakdowns.

One unsatisfactory feature of piece-rates is the tendency for management to adjust rates when it appears that workers are making high wages. In some cases the reduction of rates may be justified because they were improperly set, but too frequently a cut in rates is made so that the level of wages in one department will not be above those of other departments. Piece-rates should be established only after time and motion studies have been carefully made and tested. The rates so determined should be guaranteed to workers until there has been an important change in the character of the product, the type or quality of materials, or the methods of production.

CHAPTER VI

PAYROLL ACCOUNTING

Payroll procedures and labor wage policies of the individual firm are influenced by Federal and state social security and labor legislation. Therefore the following general topics are covered in some detail preparatory to an explanation of payroll procedures: Federal Insurance Contributions Act taxes, Federal unemployment tax, state unemployment tax, Federal income tax withholding, other withholdings such as union dues and bonds, and the Federal Fair Labor Standards Act.

FEDERAL INSURANCE CONTRIBUTIONS ACT TAXES

The Federal Social Security Act is a legislative attempt to alleviate economic insecurity by providing direct aid in the form of old-age and survivors benefits, to encourage state unemployment compensation for workers and state programs to aid needy adults and children, and to promote public health. Taxes to provide funds to support the social security program are levied under the Federal Insurance Contributions Act and the Federal Unemployment Tax act. They are correctly referred to as *payroll taxes*, but are frequently identified as social security taxes.

Employers Subject to Provisions of the Act. Most employers of business enterprises employing one or more workers are covered by the act and are subject to taxes levied to support the social security program. Certain exemptions are provided for through the technical meaning of the terms "wages," "employment," "employers," and "employees." Anyone engaging the services of another should refer to the current provisions of social security legislation to determine his payroll status.

Employees Insured under the Act. Employees insured under the act are said to be in "covered employment." Within the United States all persons performing services as employees for those employing them are in covered employment except:

a. Regularly enrolled college students doing domestic service for a local college club, fraternity, or sorority.

b. An individual employed by his son, daughter, or spouse or a child employed by his father or mother, provided the child is under twenty-one years of age.

c. Employees of the United States or an instrumentality of the United States. This exception is subject to certain technical limitations.

d. Employees of a state, political subdivision, or instrumentality thereof. However, such state or agency may enter into an agreement with the administrator of the act to bring its employees under covered employment.

e. Ministers of a church or members of a religious order (elective).

f. Employees of a religious, charitable, or educational organization. Such an organization, however, may elect to bring its employees under covered employment provided at least two-thirds of its employees concur in the election.

g. Employees of a foreign government.

h. Student nurses and interns.

i. Newspaper delivery boys under the age of eighteen.

j. Railroad workers. This group is subject to the Railroad Retirement Act and therefore not insured under the Social Security Act.

Agricultural workers, maids (homeworkers), casual laborers (workers performing services not in the regular course of the employer's trade or business), full-time life insurance salesmen, agent drivers who distribute food or beverage products (except milk) or handle laundry and dry cleaning, and full-time traveling or city salesmen are all considered to be in covered employment provided they meet certain minimum requirements under the act.

Self-employed Insured under the Act. Since Jan. 1, 1951, self-employed persons are insured under the Social Security Act. The tax levied upon the self-employed to support his coverage is in addition to the individual Federal income tax. Generally, if a person carries on a business as a sole proprietor, or renders services as an independent contractor, or is a member of a partnership or similar organization, there will be self-employment income subject to the tax rates shown in Exhibit 29, page 89. If income is derived solely from salary or wages or from dividends and interest on investments, capital gains, annuities, or pensions, there will be no self-employment income and, therefore, no self-employment tax to pay. The computation of self-employment tax is made on a separate schedule attached to the Federal income tax return. If a person has at least $400 of net earnings from self-employment during a taxable year, the return must be filed and the tax paid even though there is no Federal income tax due.

Federal Insurance Contributions Act Taxes. The Federal Insurance Contributions Act (F.I.C.A.) taxes apply to both employers and employees of business enterprises covered by the act. Provision is made for two distinct taxes collected from the employer as a single payment. An excise tax is levied on all employers, and an income tax is levied on employees. They apply only to the first $4,200 paid during each calendar year to each employee from any one employer. Employees' contributions are deducted (withheld) from the employees' wages and are payable, together with the amount of the employer's tax, to the district office of the Director of Internal Revenue.

Thus the first $4,200 of wages paid to an employee is taxable to both the employer and the employee regardless of the form of the compensation, while wages in excess of $4,200 are tax-exempt to both the employer and the employee. If a person is employed by more than one employer during a year, both the employer and the employee are taxed on the first $4,200 received from each employer; consequently it is possible that one individual's earnings may be taxed on an amount in excess of $4,200. However, an individual who has been employed by more than one employer and whose wages exceed $4,200 during any calendar year is entitled to a credit on income tax due or a refund of any amount of tax which exceeds the tax on the first $4,200 wages deducted from his wages and paid to the Director of Internal Revenue. Employers are not entitled to refunds of taxes paid on earnings in excess of $4,200 received by an individual from two or more employers.

Federal Insurance Contributions Act taxes are levied on the amount of remuneration actually or constructively paid by the employer and received by the employee. Wages are constructively paid when they are credited to the account of an employee or when the cash is made available to him. The tax levied upon the employer, using the accrual method of accounting, is recognized as a tax cost when the labor cost is recorded.

The tax rates in Exhibit 29 apply to the first $4,200 of remuneration of each employee or to the self-employment income of every individual who qualifies under the act.

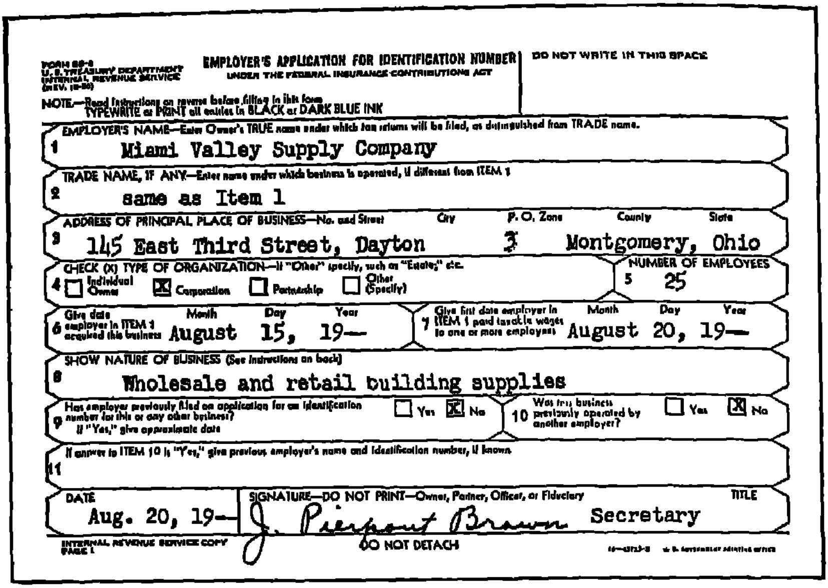
EXHIBIT 29

FEDERAL INSURANCE CONTRIBUTIONS ACT TAX RATES PROVIDED FOR IN 1954 ACT

	1954–1959	1960–1964	1965–1969	1970–1974	1975 and after
Employees........	2%	2½%	3%	3½%	4%
Employers........	2%	2½%	3%	3½%	4%
Self-employed.....	3%	3¾%	4½%	5¼%	6%

Identification and Tax Returns. Each employer must apply to the Social Security Administration for an "identification number" within 7 days after employment for wages begins, and each employee must obtain an "account number" from the same source within a 7-day period from the date he enters taxable employment. Each enterprise, regardless of the number of establishments, has only one identification number and files a combined tax return. Employers apply for an identification number on Form SS-4, Exhibit 30; employees use Form SS-5, Exhibit 31. Each employee receives a social security card with his account number which serves for his lifetime.

Each employer is required to prepare a tax return, Form 941, Exhibit 32, quarterly, on or before the last day of the first month following the period covered. Thus the quarterly return for the period ending Dec. 31 would be due on or before Jan. 31. It exhibits the total taxable wages paid to all employees and the taxable wages paid to each individual employee. It also shows the total of both the employer's and the employees' Federal Insurance Contributions Act taxes. These forms are



FORM SS-4
U. S. TREASURY DEPARTMENT
INTERNAL REVENUE SERVICE

EMPLOYER'S APPLICATION FOR IDENTIFICATION NUMBER
UNDER THE FEDERAL INSURANCE CONTRIBUTIONS ACT

DO NOT WRITE IN THIS SPACE

NOTE.—Read instructions on reverse before filling in this form
TYPEWRITE or PRINT all entries in BLACK or DARK BLUE INK

1 EMPLOYER'S NAME—Enter Owner's TRUE name under which tax returns will be filed, as distinguished from TRADE name.
Miami Valley Supply Company

2 TRADE NAME, IF ANY—Enter name under which business is operated, if different from ITEM 1
same as Item 1

3 ADDRESS OF PRINCIPAL PLACE OF BUSINESS—No. and Street / City / P. O. Zone / County / State
145 East Third Street, Dayton 3 Montgomery, Ohio

4 CHECK (X) TYPE OF ORGANIZATION—If "Other" specify, such as "Estate," etc.
☐ Individual Owner ☒ Corporation ☐ Partnership ☐ Other (Specify)

5 NUMBER OF EMPLOYEES 25

6 Give date employer in ITEM 1 acquired this business — Month August Day 15, Year 19—

7 Give first date employer in ITEM 1 paid taxable wages to one or more employees — Month August Day 20, Year 19—

8 SHOW NATURE OF BUSINESS (See instructions on back)
Wholesale and retail building supplies

9 Has employer previously filed an application for an identification number for this or any other business? If "Yes," give approximate date ☐ Yes ☒ No

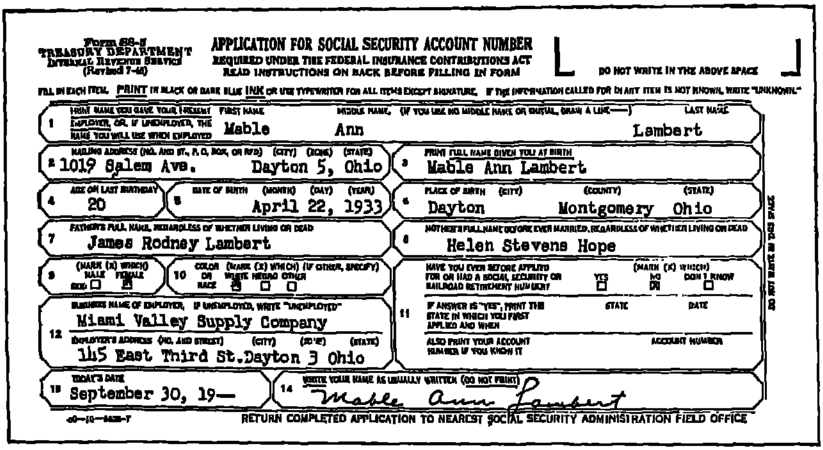
10 Was this business previously operated by another employer? ☐ Yes ☒ No

11 If answer to ITEM 10 is "Yes," give previous employer's name and identification number, if known

DATE Aug. 20, 19—
SIGNATURE—DO NOT PRINT—Owner, Partner, Officer, or Fiduciary J. Pierpont Brown
TITLE Secretary

INTERNAL REVENUE SERVICE COPY PAGE 1
DO NOT DETACH

Exhibit 30. Employer's application for identification number, Form SS-4.



Form SS-5
TREASURY DEPARTMENT
Internal Revenue Service
(Revised 7-46)

APPLICATION FOR SOCIAL SECURITY ACCOUNT NUMBER
REQUIRED UNDER THE FEDERAL INSURANCE CONTRIBUTIONS ACT
READ INSTRUCTIONS ON BACK BEFORE FILLING IN FORM

DO NOT WRITE IN THE ABOVE SPACE

FILL IN EACH ITEM. PRINT IN BLACK OR DARK BLUE INK OR USE TYPEWRITER FOR ALL ITEMS EXCEPT SIGNATURE. IF THE INFORMATION CALLED FOR IN ANY ITEM IS NOT KNOWN, WRITE "UNKNOWN."

1 PRINT NAME YOU GAVE YOUR PRESENT EMPLOYER, OR, IF UNEMPLOYED, THE NAME YOU WILL USE WHEN EMPLOYED — FIRST NAME Mable MIDDLE NAME, (IF YOU USE NO MIDDLE NAME OR INITIAL, DRAW A LINE——) Ann LAST NAME Lambert

2 MAILING ADDRESS (NO. AND ST., P. O. BOX, OR RFD) (CITY) (ZONE) (STATE)
1019 Salem Ave. Dayton 5, Ohio

3 PRINT FULL NAME GIVEN YOU AT BIRTH
Mable Ann Lambert

4 AGE ON LAST BIRTHDAY 20

5 DATE OF BIRTH (MONTH) (DAY) (YEAR) April 22, 1933

6 PLACE OF BIRTH (CITY) (COUNTY) (STATE) Dayton Montgomery Ohio

7 FATHER'S FULL NAME, REGARDLESS OF WHETHER LIVING OR DEAD
James Rodney Lambert

8 MOTHER'S FULL NAME BEFORE EVER MARRIED, REGARDLESS OF WHETHER LIVING OR DEAD
Helen Stevens Hope

9 (MARK (X) WHICH) SEX: MALE ☐ FEMALE ☒

10 COLOR OR RACE (MARK (X) WHICH) (IF OTHER, SPECIFY) WHITE ☒ NEGRO ☐ OTHER ☐

HAVE YOU EVER BEFORE APPLIED FOR OR HAD A SOCIAL SECURITY OR RAILROAD RETIREMENT NUMBER? (MARK (X) WHICH) YES ☐ NO ☒ DON'T KNOW ☐

11 IF ANSWER IS "YES", PRINT THE STATE IN WHICH YOU FIRST APPLIED AND WHEN — STATE DATE
ALSO PRINT YOUR ACCOUNT NUMBER IF YOU KNOW IT — ACCOUNT NUMBER

12 BUSINESS NAME OF EMPLOYER, IF UNEMPLOYED, WRITE "UNEMPLOYED"
Miami Valley Supply Company
EMPLOYER'S ADDRESS (NO. AND STREET) (CITY) (ZONE) (STATE)
145 East Third St. Dayton 3 Ohio

13 TODAY'S DATE September 30, 19—

14 WRITE YOUR NAME AS USUALLY WRITTEN (DO NOT PRINT) Mable Ann Lambert

DO NOT WRITE IN THIS SPACE

RETURN COMPLETED APPLICATION TO NEAREST SOCIAL SECURITY ADMINISTRATION FIELD OFFICE

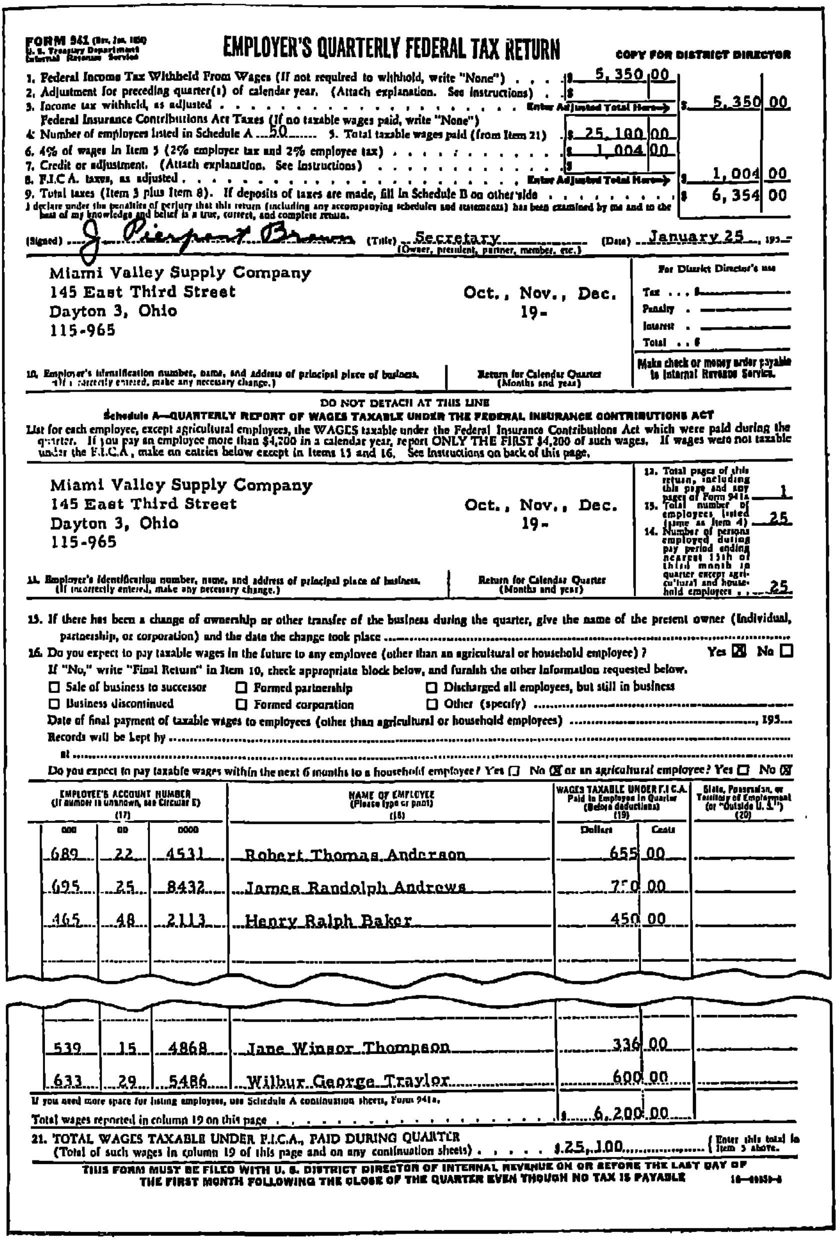
Exhibit 31. Employee's application for account number, Form SS-5.

submitted to the Director of Internal Revenue for the district in which the employer's principal business is located.

Form 941 combines the reporting of Federal Insurance Contributions Act taxes and income taxes withheld from wages. Its use in reporting income tax withholdings and deposits required of employers is explained on page 97 of this text.

Exhibit 32

Employer's Quarterly Federal Tax Return, Form 941



FORM 941 (Rev. Jan. [illegible])
U. S. Treasury Department
Internal Revenue Service

EMPLOYER'S QUARTERLY FEDERAL TAX RETURN

COPY FOR DISTRICT DIRECTOR

1. Federal Income Tax Withheld From Wages (If not required to withhold, write "None")	$ 5,350.00	
2. Adjustment for preceding quarter(s) of calendar year. (Attach explanation. See instructions)	$	
3. Income tax withheld, as adjusted . . . Enter Adjusted Total Here →		$ 5,350.00
Federal Insurance Contributions Act Taxes (If no taxable wages paid, write "None")		
4. Number of employees listed in Schedule A ...50...... 5. Total taxable wages paid (from Item 21)	$ 25,100.00	
6. 4% of wages in Item 5 (2% employer tax and 2% employee tax)	$ 1,004.00	
7. Credit or adjustment. (Attach explanation. See instructions)	$	
8. F.I.C.A. taxes, as adjusted . . . Enter Adjusted Total Here →		$ 1,004.00
9. Total taxes (Item 3 plus Item 8). If deposits of taxes are made, fill in Schedule B on other side		$ 6,354.00

I declare under the penalties of perjury that this return (including any accompanying schedules and statements) has been examined by me and to the best of my knowledge and belief is a true, correct, and complete return.

(Signed) J. Pierpont Brown (Title) Secretary (Owner, president, partner, member, etc.) (Date) January 25, 19–

Miami Valley Supply Company
145 East Third Street
Dayton 3, Ohio
115-965

Oct., Nov., Dec.
19–

10. Employer's identification number, name, and address of principal place of business. (If incorrectly entered, make any necessary change.)

Return for Calendar Quarter (Months and year)

For District Director's use
Tax . . . $
Penalty .
Interest .
Total . . $

Make check or money order payable to Internal Revenue Service.

DO NOT DETACH AT THIS LINE

Schedule A—QUARTERLY REPORT OF WAGES TAXABLE UNDER THE FEDERAL INSURANCE CONTRIBUTIONS ACT

List for each employee, except agricultural employees, the WAGES taxable under the Federal Insurance Contributions Act which were paid during the quarter. If you pay an employee more than $4,200 in a calendar year, report ONLY THE FIRST $4,200 of such wages. If wages were not taxable under the F.I.C.A., make no entries below except in Items 15 and 16. See instructions on back of this page.

Miami Valley Supply Company
145 East Third Street
Dayton 3, Ohio
115-965

Oct., Nov., Dec.
19–

11. Employer's identification number, name, and address of principal place of business. (If incorrectly entered, make any necessary change.)

Return for Calendar Quarter (Months and year)

12. Total pages of this return, including this page and any pages of Form 941a 1
13. Total number of employees listed (same as Item 4) 25
14. Number of persons employed during pay period ending nearest 15th of third month in quarter except agricultural and household employees 25

15. If there has been a change of ownership or other transfer of the business during the quarter, give the name of the present owner (individual, partnership, or corporation) and the date the change took place ....

16. Do you expect to pay taxable wages in the future to any employee (other than an agricultural or household employee)? Yes ☒ No ☐

If "No," write "Final Return" in Item 10, check appropriate block below, and furnish the other information requested below.

☐ Sale of business to successor ☐ Formed partnership ☐ Discharged all employees, but still in business
☐ Business discontinued ☐ Formed corporation ☐ Other (specify) ....

Date of final payment of taxable wages to employees (other than agricultural or household employees) ...., 19–

Records will be kept by ....

at ....

Do you expect to pay taxable wages within the next 6 months to a household employee? Yes ☐ No ☒ or an agricultural employee? Yes ☐ No ☒

Employee's Account Number (If number is unknown, see Circular E) (17)			Name of Employee (Please type or print) (18)	Wages Taxable Under F.I.C.A. Paid to Employee in Quarter (Before deductions) (19)		State, Possession, or Territory of Employment (or "Outside U. S.") (20)
000	00	0000		Dollars	Cents	
689	22	4531	Robert Thomas Anderson	655	00	
695	25	8432	James Randolph Andrews	750	00	
465	48	2113	Henry Ralph Baker	450	00	
539	15	4868	Jane Winsor Thompson	336	00	
633	29	5486	Wilbur George Traylor	600	00	

If you need more space for listing employees, use Schedule A continuation sheets, Form 941a.

Total wages reported in column 19 on this page . . . $ 6,200.00

21. TOTAL WAGES TAXABLE UNDER F.I.C.A., PAID DURING QUARTER (Total of such wages in column 19 of this page and on any continuation sheets) . . . $ 25,100 (Enter this total in Item 5 above.)

THIS FORM MUST BE FILED WITH U. S. DISTRICT DIRECTOR OF INTERNAL REVENUE ON OR BEFORE THE LAST DAY OF THE FIRST MONTH FOLLOWING THE CLOSE OF THE QUARTER EVEN THOUGH NO TAX IS PAYABLE 16—[illegible]

FEDERAL UNEMPLOYMENT TAX

The requirement of Title III of the Social Security Act has induced the various states to enact their own compensation laws. In order to accomplish this purpose the Federal law levies an excise tax on all employers of eight or more employees, bases the tax on the payroll, excluding amounts in excess of $3,000 paid to any employee, and allows a deduction from the Federal tax of credits under merit-rating provisions and all unemployment compensation taxes paid to states having laws approved by the Social Security Board, but such deduction may not exceed 90 per cent of the Federal tax. The 10 per cent of the Federal tax is used to pay the cost of the administration of state laws. All states and territories have passed unemployment compensation laws which have met the requirements of the Federal law and the approval of the Social Security Board. Should a state fail to have a satisfactory unemployment compensation law, its employers would be forced to pay a Federal tax, but employees in the state would not be eligible for benefits.

Federal Unemployment Tax (F.U.T.) Rates. The Federal unemployment tax is an excise tax on employers of four or more employees. Employees are not taxed. It is levied only upon the first $3,000 of wages paid in covered employment. It is based on wages actually paid or "constructively" paid, as in the case of the Federal Insurance Contributions Act tax. The meaning of the term "wages" is substantially the same for both the Federal unemployment tax and the Federal Insurance Contributions Act tax except for the $3,000 limitation on the former and $4,200 on the latter.

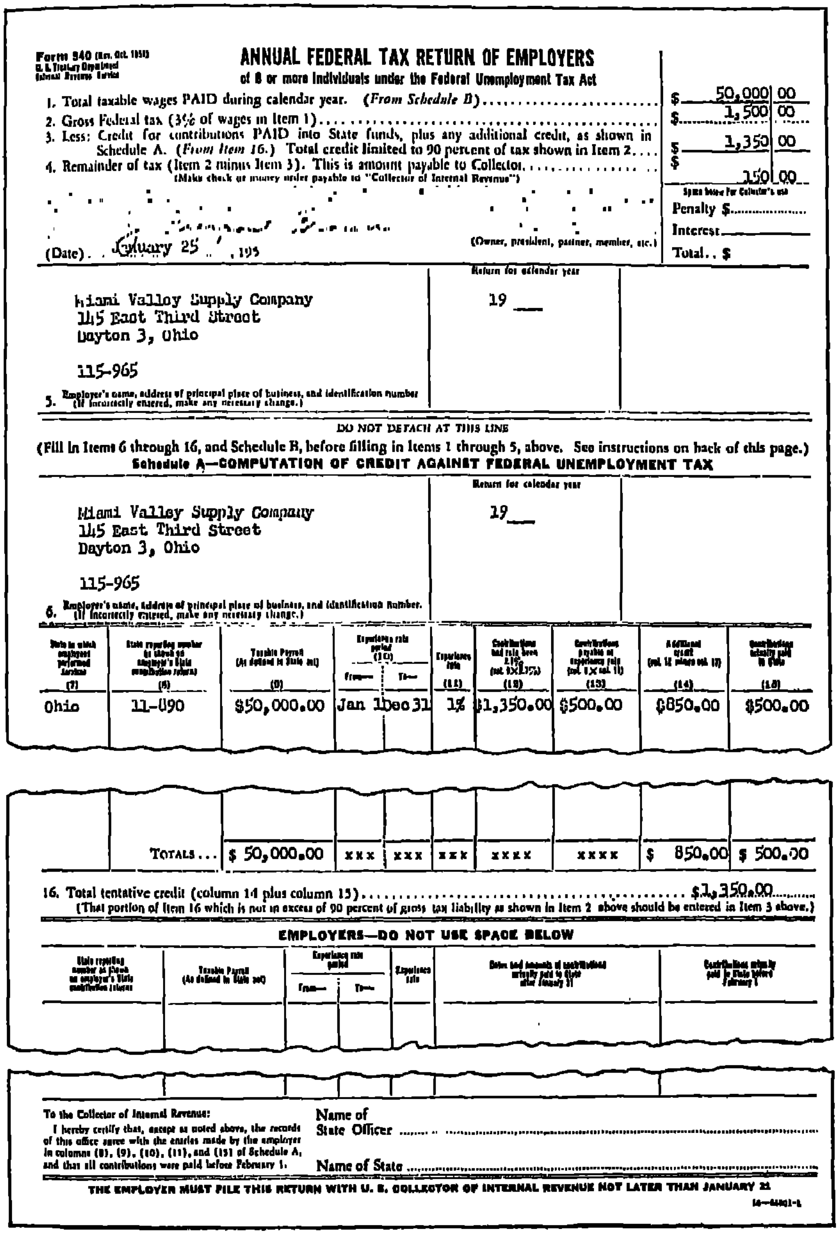
The Federal Unemployment Tax Act restricts the term "employer" to apply to any person who employs four or more individuals (in employment subject to tax) on a total of 20 or more calendar days during a calendar year, each such day being in a different calendar week. The four or more employees need not be the same individuals throughout the 20 weeks, and the 20 weeks need not be consecutive. It is not necessary that the four or more employees be employed at the same moment of time or for any particular length of time during the day.

If an employer has two different business establishments, even though located in different states, in each of which there are two employees, he is deemed to have four employees, provided that all the enterprises are nonexempt business undertakings. The number of employees includes both permanent and part-time workers in the course of an employer's business.

The Federal unemployment tax is 3 per cent of the taxable wages, but employers are permitted a credit of amounts of their contributions to state unemployment compensation funds not exceeding 90 per cent of the Federal tax. Thus, since the Federal tax is 3 per cent and credit amounting to 90 per cent, or 2.7 per cent, is allowed, the effective net Federal rate is 0.3 per cent.

EXHIBIT 33

FEDERAL UNEMPLOYED TAX RETURN, FORM 040



Form 940 (Rev. Oct. 1951)
U. S. Treasury Department
Internal Revenue Service

ANNUAL FEDERAL TAX RETURN OF EMPLOYERS
of 8 or more Individuals under the Federal Unemployment Tax Act

1. Total taxable wages PAID during calendar year. (*From Schedule B*)	$ 50,000	00
2. Gross Federal tax (3% of wages in Item 1)	$ 1,500	00
3. Less: Credit for contributions PAID into State funds, plus any additional credit, as shown in Schedule A. (*From Item 16.*) Total credit limited to 90 percent of tax shown in Item 2	$ 1,350	00
4. Remainder of tax (Item 2 minus Item 3). This is amount payable to Collector. (Make check or money order payable to "Collector of Internal Revenue")	$ 150	00

Space below for Collector's use
Penalty $
Interest
Total . . $

(Date) January 25, 195 (Owner, president, partner, member, etc.)

Return for calendar year 19__

Miami Valley Supply Company
115 East Third Street
Dayton 3, Ohio

115-965

5. Employer's name, address of principal place of business, and identification number (If incorrectly entered, make any necessary change.)

DO NOT DETACH AT THIS LINE

(Fill in Items 6 through 16, and Schedule B, before filling in Items 1 through 5, above. See instructions on back of this page.)

Schedule A—COMPUTATION OF CREDIT AGAINST FEDERAL UNEMPLOYMENT TAX

Return for calendar year 19__

Miami Valley Supply Company
115 East Third Street
Dayton 3, Ohio

115-965

6. Employer's name, address of principal place of business, and identification number. (If incorrectly entered, make any necessary change.)

State in which employees performed services (7)	State reporting number as shown on employer's State contribution returns (8)	Taxable Payroll (As defined in State act) (9)	Experience rate period (10) From—	To—	Experience rate (11)	Contributions had rate been 2.7% (col. 9 × 2.7%) (12)	Contributions payable at experience rate (col. 9 × col. 11) (13)	Additional credit (col. 12 minus col. 13) (14)	Contributions actually paid to State (15)
Ohio	11-090	$50,000.00	Jan 1	Dec 31	1%	$1,350.00	$500.00	$850.00	$500.00
	TOTALS . . .	$ 50,000.00	x x x	x x x	x x x	x x x x	x x x x	$ 850.00	$ 500.00

16. Total tentative credit (column 14 plus column 15) $1,350.00
(That portion of Item 16 which is not in excess of 90 percent of gross tax liability as shown in Item 2 above should be entered in Item 3 above.)

EMPLOYERS—DO NOT USE SPACE BELOW

State reporting number as shown on employer's State contribution returns	Taxable Payroll (As defined in State act)	Experience rate period From—	To—	Experience rate	Dates and amounts of contributions actually paid to State after January 31	Contributions actually paid to State before February 1

To the Collector of Internal Revenue:

I hereby certify that, except as noted above, the records of this office agree with the entries made by the employer in columns (8), (9), (10), (11), and (15) of Schedule A, and that all contributions were paid before February 1.

Name of State Officer ....

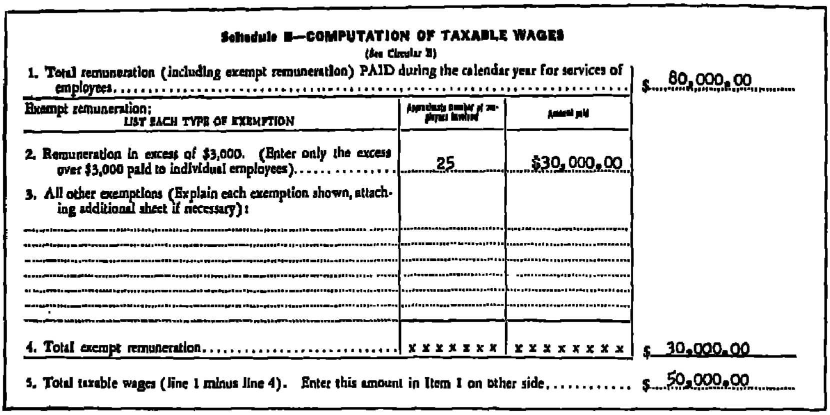
Name of State ....

THE EMPLOYER MUST FILE THIS RETURN WITH U. S. COLLECTOR OF INTERNAL REVENUE NOT LATER THAN JANUARY 31

16—44401-1

Tax Returns. Each employer is required to file a Federal unemployment tax return and pay the tax once each year on or before Jan. 31 following the close of the calendar year with the Director of Internal Revenue for the district in which the employer's principal business is located. The return must be based on the calendar year, regardless of the accounting period employed by the taxpayer.

Employers are required to use Form 940, Exhibits 33 and 34, in submitting their Federal unemployment compensation tax to the Director of Internal Revenue. If the business is terminated, the taxpayer must submit his final return on this same form.



Schedule B—COMPUTATION OF TAXABLE WAGES
(See Circular E)

1. Total remuneration (including exempt remuneration) PAID during the calendar year for services of employees			$ 80,000.00
Exempt remuneration: LIST EACH TYPE OF EXEMPTION	Approximate number of employees involved	Amount paid	
2. Remuneration in excess of $3,000. (Enter only the excess over $3,000 paid to individual employees)	25	$30,000.00	
3. All other exemptions (Explain each exemption shown, attaching additional sheet if necessary):			
4. Total exempt remuneration	x x x x x x x	x x x x x x x x	$ 30,000.00
5. Total taxable wages (line 1 minus line 4). Enter this amount in Item 1 on other side			$ 50,000.00

Exhibit 34. Reverse side of Exhibit 33.

STATE UNEMPLOYMENT TAX

Since there are 51 separate state and territorial unemployment compensation laws, each with its own peculiarities and special features, it is impossible to describe the details of each law in this book. A careful study of the regulations covering the laws of each state should be made for particular states. Some of the significant tax provisions common to all states are discussed briefly.

The state unemployment tax (S.U.T.) is levied on the wages paid by the employer to covered employees. At the present time only two states tax the employee; in these states employee taxes are withheld and paid by employers together with their own unemployment tax assessments. The employer is liable for the payment of his own tax and for the collection and payment of the employee tax.

Tax Rates. Since an employer may credit his payments of the state unemployment tax against the Federal unemployment tax equal to 90 per cent of Federal tax, most states provide for a tax levy on employers of

2.7 per cent, which amounts to 90 per cent of the Federal tax. Thus the effective rate for the Federal unemployment tax is 0.3 per cent. For example, if the taxable payroll of the X Co. is $10,000, the Federal unemployment tax would be $30 and the state unemployment tax would be $270.

Merit-rating or Experience Plans. To encourage employers to stabilize employment, state laws offer an incentive in the form of tax reduction to employers who can prevent a certain amount of irregularity in employment. The reduced rate of tax depends upon the employment history of each employer. The unemployment compensation division of each state maintains an account with each employer which shows the amount of contributions paid into the unemployment compensation fund of the particular state by an employer and the benefits paid from that fund to unemployed workers formerly on the payroll of that employer. After a minimum period of time a favorable balance in the employer's account is the basis for determining the *merit rating* or *experience rate*, which measures the degree of stability of employment. The merit rating or experience rate is applied to a table of decreasing tax rates to indicate the employer's rate of tax for the year. Generally the merit rating or experience rate is computed by the state. The employer is then informed of the tax rate to be used during the ensuing year. The Federal unemployment tax law provides for an additional credit for employers who have earned reduced rates under the state merit-rating provisions, but the effective Federal unemployment tax rate remains at 0.3 per cent. For example, if the X Co. had a state unemployment tax rate of 0.7 per cent because of its merit rating and a taxable payroll of $10,000, the Federal unemployment tax would be $30; the state unemployment tax would be $70.

Some states allow employers to make voluntary payments in addition to the required unemployment tax payments. The voluntary contribution may give a more favorable balance in the employer's account with the state and thereby effect a decrease in the tax rate. Such voluntary contributions may be considered as offers by the state which employers are free to accept or reject. The voluntary payment is remitted separately to the state and not as a part of the tax remittance. The lower tax rate is usually effective for at least a calendar year. In deciding whether the offer is to be accepted or rejected, the accountant is faced with the problem of determining whether the savings resulting from a decrease in the tax rate will more than offset the added amount paid. For example, if the X Co. has a taxable payroll of $10,000 each week, the state unemployment tax on the annual payroll of $520,000 at 2.7 per cent would be $14,040. Assume that a voluntary contribution of $100 in the current year is all that is necessary to decrease the state unemployment tax rate for the calendar year from 2.7 per cent to 0.7 per cent. The state unemployment tax would be $3,640, making a saving of $10,300 ($14,040 minus $3,640 minus $100).

Unemployment compensation benefits drawn by former employees will reduce the favorable balance in the employer's account with the state. It is incumbent upon the employer to cooperate with the state's administrative agency in presenting facts that will ensure that only eligible workers receive benefits.

In some states, employers who are not covered may elect to be included in the program. In this way they may afford their employees the protection of unemployment compensation insurance and may even reduce their own tax expenses. If an employer is not covered in any one state but employs four or more workers in several states, he must pay a full 3 per cent tax to the Federal government. Should he elect, however, to be included in the state programs, he may apply what he pays the states against the Federal tax. It is possible then that, when he has established experience ratings in the states, he may receive lower state tax rates; thus, his choice in accepting *elective coverage* may serve to reduce his total unemployment compensation tax cost. Each employer should study the merit rating and elective coverage provisions of his particular state law in order that he may control this variable tax cost.

Tax Returns. In most states employers, upon opening a new business, must prepare an informational report, usually within 30 days, to be sent to the state unemployment compensation division where the tax status of the employer is determined. All employers covered by the program are required to submit tax returns, usually on a quarterly basis, the due date being the end of the month following the close of the quarter. The report, submitted with the quarterly payment, generally requires such information as employee's social security account number, employee's name, total wages (including bonuses, etc.), date of employment and separation, and any special payments.

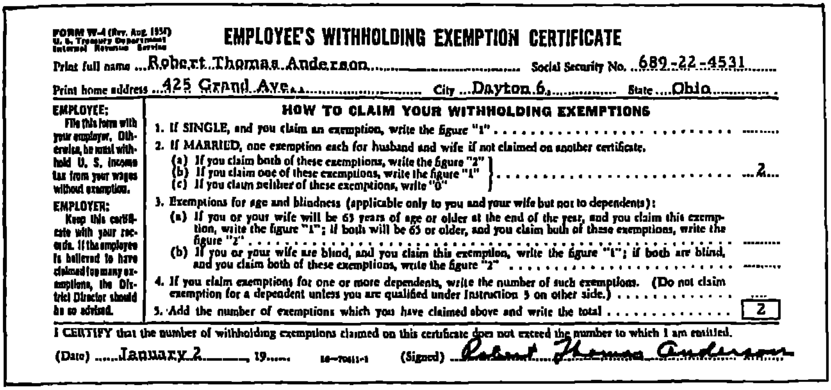
FEDERAL INCOME TAX WITHHOLDING

The scope of income tax accounting is too broad to be considered in this text. The following discussion is limited to the provisions of the income tax law that affect employers' payroll accounting procedures. Although there is no payroll tax expense for employers, they are required to withhold the Federal income tax from employees' wages and remit withholdings periodically to the Director of Internal Revenue.

Computation of Withholding. Unlike payroll taxes, there is no maximum limitation on wages earned; instead, the income tax to be withheld is based upon the total remuneration paid, regardless of the amount.

It is the duty of the employer covered by the act to obtain from each employee a withholding exemption certificate on Form W-4, Exhibit 35, which serves as the basis for allowing withholding exemptions to the employee. If an employee fails or refuses to furnish a certificate, the employer is required to withhold the tax as if the employee had claimed no withholding exemptions.

An employer must withhold the tax from each payment of wages to an employee in accordance with the employee's withholding exemption certificate and the applicable withholding rate shown in the proper wage-bracket table of withholding. A percentage method of computation may be used; however, because this procedure presupposes a certain working knowledge of income tax principles, it will not be discussed here. Employers will generally find it convenient to determine the amount of tax required to be withheld by reference to the wage-bracket tables, which are specifically authorized by law. Tables are provided for daily, weekly, biweekly, semimonthly, monthly, and miscellaneous payroll periods.



FORM W-4 (Rev. Aug. 1954)
U. S. Treasury Department
Internal Revenue Service

EMPLOYEE'S WITHHOLDING EXEMPTION CERTIFICATE

Print full name ...Robert Thomas Anderson... Social Security No. ...689-22-4531...
Print home address ...425 Grand Ave.... City ...Dayton 6,... State ...Ohio...

EMPLOYEE: File this form with your employer. Otherwise, he must withhold U. S. income tax from your wages without exemption.

EMPLOYER: Keep this certificate with your records. If the employee is believed to have claimed too many exemptions, the District Director should be so advised.

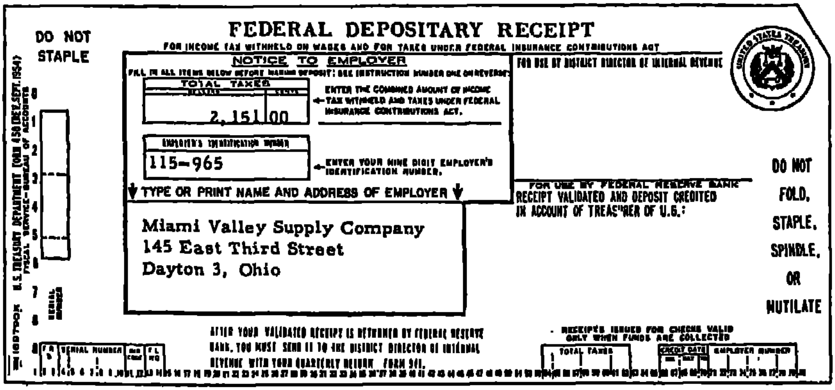
HOW TO CLAIM YOUR WITHHOLDING EXEMPTIONS

1. If SINGLE, and you claim an exemption, write the figure "1" ....
2. If MARRIED, one exemption each for husband and wife if not claimed on another certificate.
   (a) If you claim both of these exemptions, write the figure "2"
   (b) If you claim one of these exemptions, write the figure "1"
   (c) If you claim neither of these exemptions, write "0" ....2...
3. Exemptions for age and blindness (applicable only to you and your wife but not to dependents):
   (a) If you or your wife will be 65 years of age or older at the end of the year, and you claim this exemption, write the figure "1"; if both will be 65 or older, and you claim both of these exemptions, write the figure "2" ....
   (b) If you or your wife are blind, and you claim this exemption, write the figure "1"; if both are blind, and you claim both of these exemptions, write the figure "2" ....
4. If you claim exemptions for one or more dependents, write the number of such exemptions. (Do not claim exemption for a dependent unless you are qualified under Instruction 5 on other side.) ....
5. Add the number of exemptions which you have claimed above and write the total 2

I CERTIFY that the number of withholding exemptions claimed on this certificate does not exceed the number to which I am entitled.

(Date) ...January 2..., 19.... 16—70411-1 (Signed) ...Robert Thomas Anderson...

Exhibit 35. Employee's withholding exemption certificate, Form W-4.



U.S. TREASURY DEPARTMENT FORM 450 (REV. SEPT. 1954)
FISCAL SERVICE—BUREAU OF ACCOUNTS

DO NOT STAPLE

FEDERAL DEPOSITARY RECEIPT
FOR INCOME TAX WITHHELD ON WAGES AND FOR TAXES UNDER FEDERAL INSURANCE CONTRIBUTIONS ACT

NOTICE TO EMPLOYER
FILL IN ALL ITEMS BELOW BEFORE MAKING DEPOSIT: SEE INSTRUCTION NUMBER ONE ON REVERSE

TOTAL TAXES: 2,151 00 ← ENTER THE COMBINED AMOUNT OF INCOME TAX WITHHELD AND TAXES UNDER FEDERAL INSURANCE CONTRIBUTIONS ACT.

EMPLOYER'S IDENTIFICATION NUMBER: 115-965 ← ENTER YOUR NINE DIGIT EMPLOYER'S IDENTIFICATION NUMBER.

TYPE OR PRINT NAME AND ADDRESS OF EMPLOYER

Miami Valley Supply Company
145 East Third Street
Dayton 3, Ohio

FOR USE BY DISTRICT DIRECTOR OF INTERNAL REVENUE

FOR USE BY FEDERAL RESERVE BANK
RECEIPT VALIDATED AND DEPOSIT CREDITED IN ACCOUNT OF TREASURER OF U.S.:

DO NOT FOLD, STAPLE, SPINDLE, OR MUTILATE

AFTER YOUR VALIDATED RECEIPT IS RETURNED BY FEDERAL RESERVE BANK, YOU MUST SEND IT TO THE DISTRICT DIRECTOR OF INTERNAL REVENUE WITH YOUR QUARTERLY RETURN FORM 941.

RECEIPTS ISSUED FOR CHECKS VALID ONLY WHEN FUNDS ARE COLLECTED

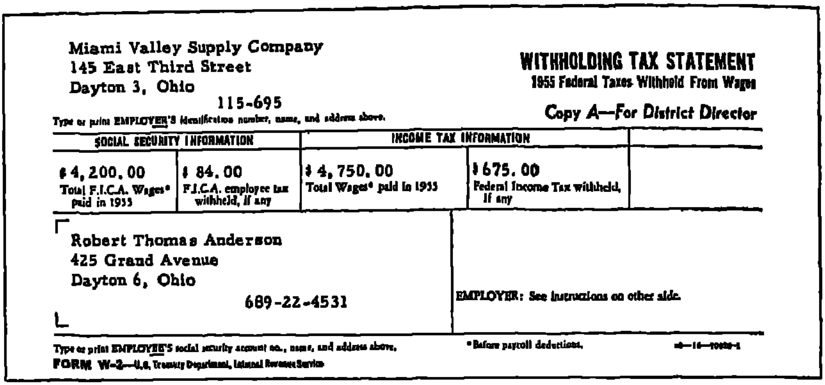
SERIAL NUMBER | TOTAL TAXES | CREDIT DATE | EMPLOYER NUMBER

Exhibit 36. Federal depositary receipt, Form 450.

Depositing and Reporting of Federal Insurance Contributions Act Taxes and Income Taxes Withheld. The preparation of the following two forms is required by the Treasury Department: Federal Depositary Receipt, Form 450, shown as Exhibit 36; and Form 941, Employer's

Quarterly Federal Tax Return, Exhibit 32, illustrated on page 91 of this text.

Employers are instructed to add the following: (*a*) employer's Federal Insurance Contributions Act taxes levied on taxable wages paid, (*b*) employees' Federal Insurance Contributions Act taxes withheld by the employer, and (*c*) employees' Federal income tax withheld by employer. If the total of any month (except the third month of a quarter) is more than $100, the total amount of such taxes should be deposited in a Federal reserve bank or an authorized local bank, accompanied by Federal Depositary Receipt, Form 450, within 15 days after the close of each month. An employer whose monthly total of these taxes amounts to $100 or less is not required to make monthly deposits, but he may do so if he desires. Likewise, any employer who wishes to make a deposit of taxes for the third month of a quarter may do so.



Miami Valley Supply Company
145 East Third Street
Dayton 3, Ohio
115-695
Type or print EMPLOYER'S identification number, name, and address above.

WITHHOLDING TAX STATEMENT
1955 Federal Taxes Withheld From Wages
Copy A—For District Director

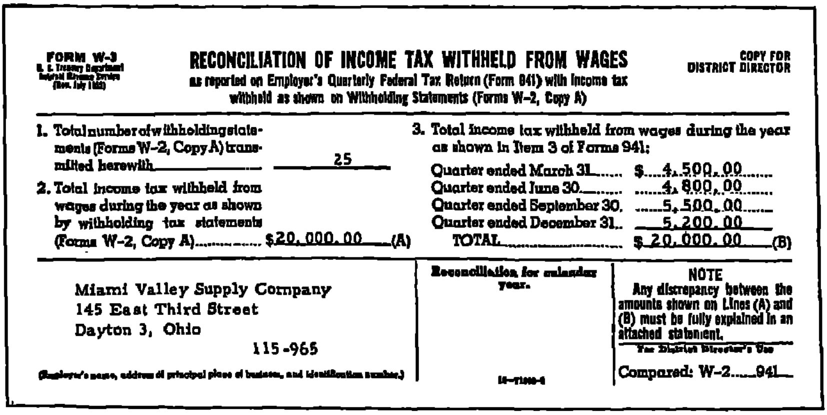
SOCIAL SECURITY INFORMATION		INCOME TAX INFORMATION		
$4,200.00 Total F.I.C.A. Wages* paid in 1955	$ 84.00 F.I.C.A. employee tax withheld, if any	$ 4,750.00 Total Wages* paid in 1955	$675.00 Federal Income Tax withheld, if any	

Robert Thomas Anderson
425 Grand Avenue
Dayton 6, Ohio
689-22-4531

EMPLOYER: See instructions on other side.

Type or print EMPLOYEE'S social security account no., name, and address above.
*Before payroll deductions.
FORM W-2—U.S. Treasury Department, Internal Revenue Service

Exhibit 37. Employee's withholding receipt, Form W-2.



FORM W-3
U. S. Treasury Department
Internal Revenue Service
(Rev. July [illegible])

RECONCILIATION OF INCOME TAX WITHHELD FROM WAGES
as reported on Employer's Quarterly Federal Tax Return (Form 941) with income tax withheld as shown on Withholding Statements (Forms W-2, Copy A)

COPY FOR DISTRICT DIRECTOR

1. Total number of withholding statements (Forms W-2, Copy A) transmitted herewith 25
2. Total income tax withheld from wages during the year as shown by withholding tax statements (Forms W-2, Copy A) .... $20,000.00 (A)
3. Total income tax withheld from wages during the year as shown in Item 3 of Forms 941:

Quarter ended March 31	$ 4,500.00
Quarter ended June 30	4,800.00
Quarter ended September 30	5,500.00
Quarter ended December 31	5,200.00
TOTAL	$ 20,000.00 (B)

Miami Valley Supply Company
145 East Third Street
Dayton 3, Ohio
115-965
(Employer's name, address of principal place of business, and identification number.)

Reconciliation for calendar year.

NOTE
Any discrepancy between the amounts shown on Lines (A) and (B) must be fully explained in an attached statement.

For District Director's Use
Compared: W-2 941

Exhibit 38. Reconciliation of income tax withheld from wages, Form W-3.

The Employer's Quarterly Federal Tax Return, Form 941, Exhibit 32, is due the last day of the first month following the end of each quarter. If an employer makes a deposit of taxes for the third month of a quarter, the return is then due on the tenth day of the second month following the calendar quarter. Separate computations of the income tax withheld and the Federal Insurance Contributions Act taxes are totaled to show the amount of the quarterly tax due. Each return must be accompanied by remittance (cash, check, money order, depositary receipt, or combination of these) for the total taxes due when filed with the Director of Internal Revenue.

EXHIBIT 39

CHART OF BASIC PAYROLL TAX REQUIREMENTS

Basic requirement	F.I.C.A.	F.U.T.	S.U.T.	Federal income tax withholding
Maximum annual taxable wages for each employee	$4,200	$3,000	$3,000	No maximum
Minimum number of employees for any one employer	One	Four for minimum of 20 days, each day in a different calendar week	Varies with states	One
Effective tax rates	Employee: 1954–1959: 2 % Employer: 1954–1959: 2 %	Employee: none Employer: 0.3 %	Employee: none (for most states) Employer: 2.7 % or experience rate	Employee: wage bracket table of witholding Employer: none
Effect of "merit" or "experience" rate	None	Effective tax rate remains 0.3 %	Reduced tax rate to a qualified employer	None
Tax returns filed by employer	Calendar quarter	Calendar year	Calendar quarter (for most states)	Calendar quarter
Remittances	Included with Federal income tax withholding; to depositary for Federal taxes within 15 days after end of each month if total withholdings are $100 or more. If less than $100, to Director of Internal Revenue with return by end of month following each calendar quarter	To Director of Internal Revenue; return filed by Jan. 31	To state collector of taxes before end of month following each calendar quarter (for most states)	See F.I.C.A. tax

On or before each Jan. 31 and at the end of employment, an employer must give each employee a withholding statement in duplicate on Form W-2, Exhibit 37, showing the total wages paid and the amount of income tax and Federal Insurance Contributions Act tax withheld. Also by the end of each January an employer must file Form W-3, Reconciliation of Income Tax Withheld from Wages, Exhibit 38, together with copies of all withholding statements furnished employees on Form W-2 for the preceding calendar year.

Chart of Basic Payroll Tax Requirements. The payroll taxes, coverage, and tax return requirements for the Federal Insurance Contributions Act, Federal Unemployment Tax Act, state unemployment tax acts, and the Federal income withholding provisions are summarized in Exhibit 39, Chart of Basic Payroll Tax Requirements.

OTHER PAYROLL DEDUCTIONS

Payroll computations may include such deductions from employees' wages and salaries as union initiation fees and dues, savings installments for bond purchases, company health and welfare dues, amounts in settlement of salary or commission advances, and charitable contributions.

Union Fees and Dues. In many concerns the "checkoff" system is used whereby the company agrees to withhold union initiation fees and regular dues when computing the employees' "take home" pay. The company sets up a current liability account to the particular union, such as Employees' Withholdings for Union Dues, and remits a lump-sum payment to the union monthly or quarterly. In some concerns where many separate unions are represented, each with its own schedule of fees, dues, and remittance dates, the checkoff system greatly complicates the process of payroll preparation, since each employee or group of employees may become a special case.

Savings Contributions. A popular form of savings in many concerns is the purchase of government bonds. The amount withheld from the employee's pay is accumulated as a liability on the company's books under such an account title as Employees' Withholdings for U.S. Bond Purchases until the employee's wage deductions amount to the cost of a bond. When the bond is issued to the employee, the company debits its liability account and credits a general cash or special cash fund account which may be maintained. The problem is complicated in concerns where there is a heavy labor turnover, because many employees leave before enough is accumulated to buy a bond. This necessitates a refund check being issued to the former employee to cover deductions made since the last issue of bonds to him. Other savings contributions may be for credit unions, purchase of company stock, or Christmas savings.

Company Health and Welfare Dues. Many concerns have their own health, accident, and welfare programs to which both the company and employees contribute. The employees' share is generally withheld each payroll period and is credited to a liability account, such as Employees' Withholdings for Health and Welfare Dues.

Salary and Commission Advances. Some companies follow the policy of making advance payments to officers and salesmen. When the advances are made, it is customary to charge an account such as Salary Advances to Employees and credit Cash in Bank for the full amount of the advance, no payroll deductions being made at the time. Then when a final settlement is made through the regular payroll channels, the Salaries or Commissions account is charged for the total amount earned, Salary Advances to Employees is credited for the amount of the advance, other withholdings are shown as credits, and Cash in Bank is credited for the net amount of the check, after all deductions, including the advance, have been considered.

Charitable Contributions. A common method of making contributions to charitable organizations is by means of payroll deductions. Employees authorize a specified amount to be withheld from their wages, and the amounts are accumulated in a liability account such as Employees' Withholdings for Charitable Contributions. At regular intervals remittances are made by the employer to such organizations as United Funds, Community Chest, National Foundation for Infantile Paralysis, or the American Red Cross.

FEDERAL FAIR LABOR STANDARDS ACT

The Federal Fair Labor Standards Act establishes a minimum hourly wage of $1.00 as well as a maximum work week of 40 hours. An employee may, of course, work more than the stipulated hours each week, but for all time worked in excess of 40 hr. in any seven consecutive days used consistently by an employer as his established work week, an employee must be paid an additional premium of 50 per cent of his regular hourly rate.

The act covers all employers whose business activities are directly or indirectly engaged in interstate commerce or in the production of goods destined for interstate commerce. Employees of covered employers are within the scope of the act unless wholly or partly exempt.

Wholly exempt employees include bona fide executives and administrative employees, bona fide professional employees, outside salesmen, employees of retail sales and service establishments, agricultural workers, persons engaged in fishing, transportation workers, newspaper workers on papers of less than 4,000 circulation, and small telephone exchanges, as defined by the regulations.

Partly exempt employees are divided into two classes: (1) those exempt from the hour provisions only—a group which, in addition to certain specific exemptions, includes seasonal workers actually listed in the law and also those which the administrator may designate as "seasonal," employees of rail and other carriers, and employees coming within certain collective bargaining agreements; (2) those exempt from the wage provisions only—a group which includes learners, apprentices, handicapped workers, and messengers. These exemptions become effective only upon approval by the administrator of specific applications for exemption. The act also has provisions regulating oppressive child labor.

Wages may be in the form of cash remuneration, but may also include the reasonable cost to the employer of board, lodging, and other facilities voluntarily accepted by employees. Although production bonuses, piecework earnings, and salaries are part of cash wages, a profit-sharing bonus based upon business earnings and distributed at the discretion of the company need not be included in computing the regular rate of pay for overtime payments.

Though no special form is prescribed under the act, records must be kept in sufficient detail to enable the employer at any time to prove compliance with the wage and hour regulations. Violation of the act is subject to criminal and civil penalties. It is possible for an employee to recover double the difference between the compensation paid and the amount that his employer should have paid him under the act. He may also recover court costs and attorney fees.

Computation of Wages. In general the regulations under the Federal Fair Labor Standards Act provide that wages should be computed in the following ways, varying according to the payroll plan in effect in any particular business:

$$\text{Regular earnings} + \text{overtime earnings} = \text{total earnings}$$

Regular earnings:

$$\text{Regular hourly rate} \times \text{total hours worked} = \text{regular earnings}$$

Overtime earnings:

$$\frac{\text{Regular hourly rate}}{2} \times \text{number of hours worked in excess of 40} = \text{overtime earnings}$$

If an employee has an established hourly rate, no problem arises; thus if he has an established rate of \$1 an hour and works 48 hr. in one week, his earnings would be

$$\begin{array}{rl} \$1.00 \times 48 = & \$48.00 \text{ Regular earnings} \\ \frac{\$1.00}{2} \times 8 = & 4.00 \text{ Overtime earnings} \\ & \overline{\$52.00} \text{ Total earnings} \end{array}$$

If an employee is paid upon some basis other than an established hourly rate, then the regular hourly rate must be computed before the above computation can be made.

First, assume that an employee is paid a regular weekly wage for a scheduled number of hours not exceeding 40. If he receives $40 for a 40-hr. week and works 48 hr., then his regular hourly rate is $\frac{\$40}{40 \text{ hr.}}$ or $1 an hour. His earnings are then computed as above.

Second, assume that an employee is paid a regular weekly wage for a scheduled number of hours in excess of 40. Since the hours in excess of 40 include an overtime premium, *equivalent pay hours* must be determined by adding to the scheduled number of weekly hours 50 per cent of the number of hours in excess of 40. If he receives $44 for a 50-hr. week, his regular hourly rate becomes $\frac{\$44}{50 + (50\% \times 10) \text{ or } 55 \text{ hr.}}$, or $0.80 an hour. Suppose that he worked 60 hr. in 1 week. His earnings would be

$$\begin{aligned} \$0.80 \times 60 &= \$48.00 \text{ Regular earnings} \\ \frac{\$0.80}{2} \times 20 &= 8.00 \text{ Overtime earnings} \\ & \overline{\$56.00} \text{ Total earnings} \end{aligned}$$

Third, assume that an employee is paid a regular weekly wage but no schedule of hours is maintained. His regular hourly rate is determined in the following manner:

$$\frac{\text{Regular weekly wage}}{\text{Total hours worked}} = \text{regular hourly rate}$$

If he receives $40 a week and works 50 hr., then his hourly rate is $\frac{\$40}{50} = \$0.80$.

His earnings are

$$\begin{aligned} \$0.80 \times 50 &= \$40.00 \text{ Regular earnings} \\ \frac{\$0.80}{2} \times 10 &= 4.00 \text{ Overtime earnings} \\ & \overline{\$44.00} \text{ Total earnings} \end{aligned}$$

Fourth, assume that an employee is paid according to the amount of production he is able to put out. His weekly wage must be determined by multiplying his production by his rate. If he receives $1 for each unit he completes, finishes 40, and works 50 hr., his weekly wage would be

40 units @ $1 = $40

His hourly rate is

$$\frac{\text{Regular weekly wage}}{\text{Total hours worked}}, \text{ or } \frac{\$40}{50}, \text{ or } \$0.80$$

His earnings are

$$\begin{aligned} \$0.80 \times 50 \text{ (or 40 units @ \$1)} &= \$40.00 \text{ Regular earnings} \\ \frac{\$0.80}{2} \times 10 &= 4.00 \text{ Overtime earnings} \\ &\overline{\$44.00} \text{ Total earnings} \end{aligned}$$

Fifth, assume that an employee is paid on a biweekly, semimonthly, or monthly basis. The same methods as given above are used to compute his total earnings. It is necessary first, however, to determine his regular weekly wage and the number of hours he worked during a week. If he receives $100 semimonthly, his regular weekly wage is

$$\begin{aligned} \$\ 100 \times 24 \text{ (number of pay periods in year)} &= \$2{,}400.00 \\ \$2{,}400 \div 52 \text{ (total weeks in year)} &= \$\quad 46.15 \end{aligned}$$

Suppose that during this semimonthly period he worked the following hours:

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Hours	8	8	9	10	8	0	0	8	8	8	8	8	0	0	8

He worked a total of 91 hr.: 43 hr. during the first week, 40 the second, and 8 on the first day of the third week. Now if no schedule of hours is maintained, his regular hourly rate for the first week would be

$$\frac{\$46.15 \text{ weekly wage}}{43 \text{ total hours worked}} = \$1.07$$

His total earnings for the semimonthly period are

$$\begin{aligned} &\$100.00 \text{ Regular earnings} \\ \frac{\$1.07}{2} \times 3 \text{ (overtime hours)} = &1.61 \text{ Overtime earnings} \\ &\overline{\$101.61} \text{ Total earnings} \end{aligned}$$

The computation of the overtime premium recommended in the regulations under the Federal Fair Labor Standards Act accomplishes three purposes:

a. The method provides uniformity for statistical comparisons.

b. The regular earnings, found by multiplying the regular hourly rate by the total hours worked, provide the base on which premiums for payroll insurance, such as workmen's compensation insurance, is computed.

c. The overtime premium, found by multiplying one-half the hourly rate by the hours in excess of 40 in any week, segregates the overtime cost, which may be treated in the following ways:

(1) Charged as a direct labor cost when a buyer agrees to pay an additional price for goods rushed through production during overtime hours.

(2) Charged as an indirect labor cost and allocated to production along with other overhead costs whenever production has been planned to include overtime hours.

(3) Charged directly to Profit and Loss whenever overtime hours have resulted from inefficient planning or from abnormal conditions.

OTHER PAYROLL CONSIDERATIONS

Nearly all states have legislation requiring employers to carry workmen's compensation insurance. Because of the variations in the regulations among the states and because of the differences in rates according to localities and the nature of the occupation, no attempt will be made here to discuss this highly specialized subject. It is sufficient to point out that attention must be given to these legal requirements in handling payrolls.

The accountant may have additional payroll classifications to make because of workmen's compensation regulations. For example, a business may keep three regular payrolls: factory, office, and executive. Designers may be included in the factory payroll because their labor can be assigned directly to a finished product. The nature of their work, however, is not hazardous; the insurance rate, consequently, may be the same as for office employees. The amount of their wages would then have to be added to the office payroll in fixing the base upon which insurance premiums are to be computed. Likewise, a shop superintendent, listed on the executive payroll, may have a job bearing greater risks than other office employees. Hence his salary may have to be added to the factory payroll.

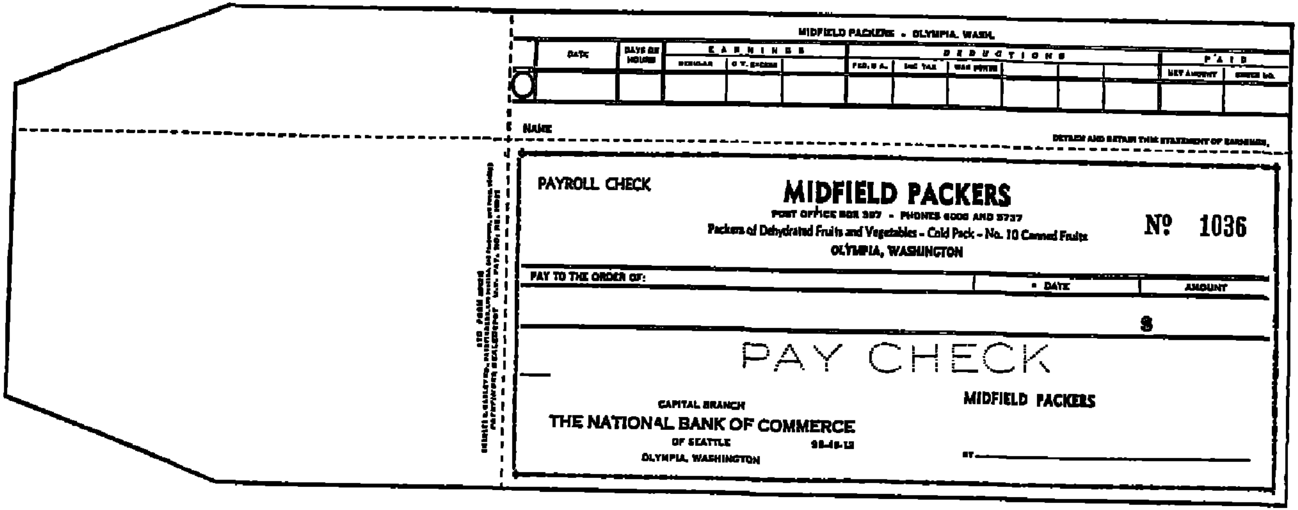
The accountant and business executive should become familiar with the legal and contractual regulations too specialized to be considered in a general text yet having an effect upon handling payrolls. Government contracts and union agreements setting minimum wage standards and overtime pay requirements after 8 hr. of work in any day or double time on Sundays and holidays must be given consideration in payroll accounting.

PAYROLL RECORDS AND ACCOUNTS

The social security laws specify the various data which must be kept, but they do not specify what forms should be used. Each employer is permitted to maintain the type of records best suited to his own purposes and is allowed some flexibility in building a payroll system. He must furnish to each of his employees a withholding statement (U.S. Treasury Department Form W-2, Exhibit 37, page 98). Each statement shows the name of the employer, the name of the employee, the period covered by the statement, the total wages paid, and the amount of the Federal Insurance Contributions Act tax and the Federal income tax withheld. Employers usually inform employees of their total wages earned and the amount of each withholding with each pay check. Various methods are employed in notifying the employee, such as a separate slip or statement, a notation on a detachable stub or section of the payroll check, or a notation on the payroll envelope.

Exhibit 40

Payroll Check with Detachable Stub



MIDFIELD PACKERS • OLYMPIA, WASH.

DATE	DAYS OR HOURS	EARNINGS			DEDUCTIONS						PAID	
		REGULAR	O.T. EXCESS		FED. O.A.	INC. TAX	WAR BONDS				NET AMOUNT	CHECK NO.

NAME

DETACH AND RETAIN THIS STATEMENT OF EARNINGS.

PAYROLL CHECK

MIDFIELD PACKERS

POST OFFICE BOX 387 • PHONES 6006 AND 5737

Packers of Dehydrated Fruits and Vegetables – Cold Pack – No. 10 Canned Fruits

OLYMPIA, WASHINGTON

Nº 1036

PAY TO THE ORDER OF: • DATE AMOUNT

$

PAY CHECK

CAPITAL BRANCH

THE NATIONAL BANK OF COMMERCE

OF SEATTLE 98-46-12

OLYMPIA, WASHINGTON

MIDFIELD PACKERS

BY

A standard multirecord pay check with a detachable stub is illustrated as Exhibit 40. The stub at the top is torn off by the employee and retained as his permanent record of earnings, deductions, and net pay. When the stub is written, the identical entries on the employee's compensation record are made as by-products of the operation. Thus time is saved and posting errors are minimized. The body of this particular pay check is arranged to permit typing of the employee's name, the date, and the amount of the check on a single writing line.

In order to provide the information required for reports and tax returns, some sort of individual compensation record should be kept. A form of compensation record is illustrated as Exhibit 41. Such a record not only provides management with individual employee data required by various Federal and state regulations in preparing quarterly and annual reports but also supplies a complete record which is valuable for managerial control of personnel and payrolls.

The information used for posting to the compensation record is obtained from the payroll record, the content of which is partly determined by the requirements of the compensation records. The original data for the payroll are obtained from the time reports which show the hours worked or from piecework records which show the number of pieces finished, the rate, and the time worked.

The payroll itself is a columnar record which lists the employees and gives other pertinent information. Employees may be listed in alphabetical order on one sheet; they may be grouped by function; or, where the firm is large, a separate payroll may be prepared for each department. The number of columns to be used is determined by the information to be shown. Usually columns appear for employee's name; number; department; time worked, which may be given in total or detailed by days; rate of pay; total salary or wages; other compensation, showing kind and amount; earnings exempt from payroll taxes; payroll deduction for each payroll tax; company deductions; and the net amount to be paid the employee.

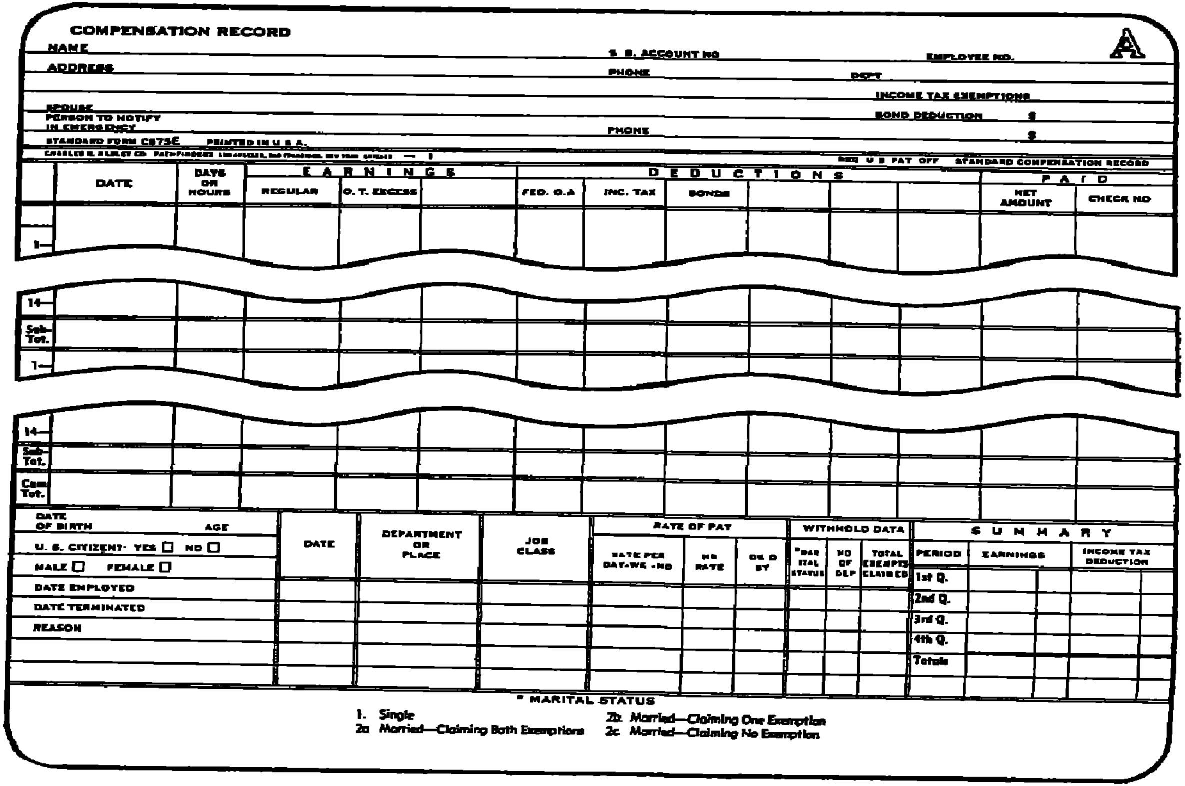
There are many different forms of payroll sheets that meet these requirements. Exhibit 42 is an illustration of a payroll sheet that contains a record of daily time and shows payroll deductions.

Recording the Payroll. The summary of the payroll is the basis for the preparation of the payroll voucher for each payroll period for the total amount of wages and salaries. The payroll voucher is entered in the voucher register as a debit to the Payroll Control account and as a credit to Vouchers Payable and other liability accounts for amounts withheld from wages.

Checks in payment of the payroll are entered in the check register as a debit to Vouchers Payable and as a credit to Cash. Usually a single line is used showing the block of check numbers, such as "checks 18,200 to 19,000," required in disbursing the week's payroll. If payroll checks are drawn on a special payroll bank account, the procedure is the same except

EXHIBIT 41

INDIVIDUAL EMPLOYEE COMPENSATION RECORD



COMPENSATION RECORD

NAME S. S. ACCOUNT NO EMPLOYEE NO.

ADDRESS PHONE DEPT

INCOME TAX EXEMPTIONS

SPOUSE

PERSON TO NOTIFY IN EMERGENCY BOND DEDUCTION $

PHONE $

STANDARD FORM C575E PRINTED IN U. S. A.

CHARLES R. HADLEY CO. [illegible] — I

REG. U. S. PAT. OFF. STANDARD COMPENSATION RECORD

	DATE	DAYS OR HOURS	EARNINGS			DEDUCTIONS						PAID	
			REGULAR	O. T. EXCESS		FED. O.A.	INC. TAX	BONDS				NET AMOUNT	CHECK NO
1—													
14—													
Sub-Tot.													
1—													
14—													
Sub-Tot.													
Cum. Tot.													

DATE OF BIRTH AGE

U. S. CITIZEN: YES ☐ NO ☐

MALE ☐ FEMALE ☐

DATE EMPLOYED

DATE TERMINATED

REASON

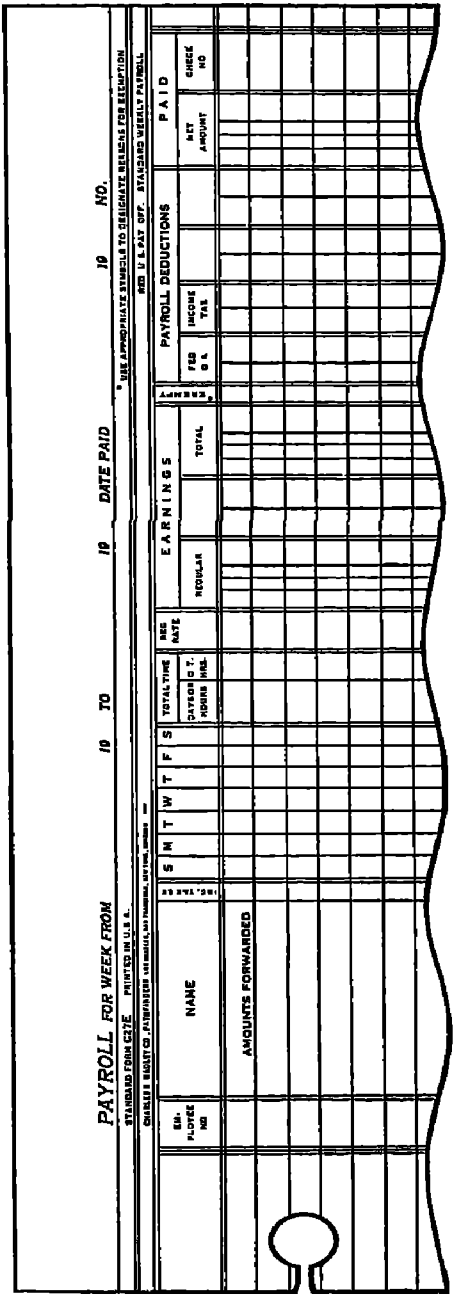
DATE	DEPARTMENT OR PLACE	JOB CLASS	RATE OF PAY			WITHHOLD DATA			SUMMARY		
			RATE PER DAY-WK.-MO	HR RATE	OK'D BY	*MARITAL STATUS	NO OF DEP	TOTAL EXEMPTS CLAIMED	PERIOD	EARNINGS	INCOME TAX DEDUCTION
									1st Q.		
									2nd Q.		
									3rd Q.		
									4th Q.		
									Totals		

* MARITAL STATUS

1. Single
2a Married—Claiming Both Exemptions
2b Married—Claiming One Exemption
2c Married—Claiming No Exemption

EXHIBIT 42

PAYROLL RECORD



PAYROLL FOR WEEK FROM 19 TO 19 DATE PAID 19 NO.

STANDARD FORM C27E PRINTED IN U.S.A.

* USE APPROPRIATE SYMBOLS TO DESIGNATE REASONS FOR EXEMPTION

REG. U.S. PAT. OFF. STANDARD WEEKLY PAYROLL

EM-PLOYEE NO	NAME	INC. TAX EX.	S	M	T	W	T	F	S	TOTAL TIME		REG RATE	EARNINGS			EXEMPT*	PAYROLL DEDUCTIONS				PAID	
										DAYS OR HOURS	O.T. HRS.		REGULAR		TOTAL		FED O.A.	INCOME TAX			NET AMOUNT	CHECK NO
	AMOUNTS FORWARDED																					

that a single check is drawn on the regular bank account and is entered in the check register in order to create the special payroll fund. If employees are paid by cash, a single check payable to the paymaster or to the payroll cash fund is written and is entered in the check register. The cash is inserted in payroll envelopes.

Summary of Payroll Entries. In order to illustrate the entries required to record a complete payroll with withholdings and to recognize employer's payroll taxes, the following conditions are assumed:

PAYROLL SUMMARY FOR THE MONTH ENDED JAN. 31, 19—

Total payroll before deductions		$20,000
Withholdings:		
Employees' withholdings for F.I.C.A. tax	$400	
(Assume employees' F.I.C.A. tax of 2%)		
Employees' withholdings for Federal income tax	3,000	
Employees' withholdings for union dues	500	
Employees' withholdings for health and welfare dues	200	
(Assume employees' share is 1%)		
Employees' withholdings for U.S. Savings Bonds purchases	1,000	
Employees' withholdings for charitable contributions	800	
Salary advances to employees	300	
Total withholdings		6,200
Net amount to be paid		$13,800

STATEMENT OF EMPLOYER'S PAYROLL TAXES FOR THE MONTH ENDED JAN. 31, 19—

F.I.C.A. tax	$400
(Rate of 2% of $20,000 payroll)	
F.U.T.	60
(Rate of 0.3% of $20,000 payroll)	
S.U.T.	540
(Rate of 2.7% of $20,000 payroll)	
Health and welfare dues	200
(Assume company's share is 1% of payroll)	
Total employer's payroll taxes and dues	$1,200

When the payroll for the week is vouchered, it is entered in the voucher register as follows:

Payroll Control	$20,000	
Vouchers Payable		$13,800
Employees' Withholdings for F.I.C.A. Tax		400
Employees' Withholdings for Federal Income Tax		3,000
Employees' Withholdings for Union Dues		500
Employees' Withholding for Health and Welfare Dues		200
Employees' Withholdings for U.S. Bond Purchases		1,000
Employees' Withholdings for Charitable Contributions		800
Salary Advances to Employees		300

In the check register the following entry is required to record the payment of the payroll:

Vouchers Payable	$13,800	
Cash		$13,800

The following journal entry is made to record the employer's payroll taxes and dues for the month and to recognize the corresponding liabilities incurred:

Factory Overhead Control	$1,200	
Accrued Employer's F.I.C.A. Tax		$400
Accrued F.U.T		60
Accrued S.U.T		540
Accrued Health and Welfare Dues		200

When vouchers are prepared and payments are made to the proper recipients of the above liabilities, the following entries are made in the voucher register:

For F.I.C.A. and Federal income taxes:		
Employees' Withholdings for F.I.C.A. Tax	$400	
Employees' Withholdings for Federal Income Tax	3,000	
Accrued Employer's F.I.C.A. tax	400	
Vouchers Payable		$3,800
For union dues:		
Employees' Withholding for Union Dues	$500	
Vouchers Payable		$500
For health and welfare dues:		
Employees' Withholdings for Health and Welfare Dues	$200	
Accrued Health and Welfare Dues	200	
Vouchers Payable		$400
For charitable contributions:		
Employees' Withholdings for Charitable Contributions	$800	
Vouchers Payable		$800
For S.U.T., the amount being the tax incurred for the taxable payroll for calendar quarter:		
Accrued S.U.T	xxx	
Vouchers Payable		xxx
For F.U.T., the amount of the tax incurred for the taxable payroll for the calendar year:		
Accrued F.U.T	xxx	
Vouchers Payable		xxx

Each of the above entries is followed by an entry in the check register debiting Vouchers Payable and crediting Cash.

Since employees may authorize varying amounts to be withheld for the purchase of U.S. Bonds, companies with large payrolls frequently purchase the bonds in advance and hold them in a special fund until an stant in total amount but fluctuate per unit as production activity changes.

Semifixed costs are those which remain fixed in total amount over a relatively short range of variation in output and then are abruptly changed to a new level, where they remain fixed in total amount for another short range of output. For example, if a third shift is added without increasing plant facilities, normally fixed costs such as supervision salaries may be increased because of the necessity of night supervisors; insurance premiums may be raised because of additional fire, theft, and accident risks; and some equipment rentals may be accelerated.

Variable costs include repairs, power, workmen's compensation, supplies, and indirect labor, which are typical of costs varying in total amount with changes in productive activity. The increase or decrease in variable overhead costs need not be in the same proportion to the change in plant activity; however, in many cases there is a directly proportional relationship. Variable costs per unit remain relatively constant with changes in production. Thus variable costs fluctuate in total amount but tend to remain constant per unit as production activity changes.

Control of Overhead Costs. The division of the overhead into fixed, semifixed, and variable costs is an important one because it centers the attention of management on those cost items which can be controlled and encourages increasing the volume of production so that by spreading fixed and semifixed overhead costs over a larger production, the overhead cost per unit can be reduced.

When overhead costs are properly classified, management is given the opportunity to scrutinize them in detail and to eliminate or to decrease outlays which are not essential to efficient operation. It is a widely recognized maxim that it is easier to increase overhead costs than it is to decrease them. When an extra employee is added to aid in clerical work during a peak period, the work is so adjusted that it is difficult to rearrange the work so that his services are no longer needed. Any business subject to seasonal conditions is forced to increase and to decrease its supervisory, clerical, and other classes of indirect workers to meet changes in demand. Frequently there is a lag between the increasing need for additional help and the acquiring of additional help; there is more commonly a lag between the decline in indirect work to be performed and the decrease in personnel.

Management's struggle to decrease overhead costs is carried to other types of costs such as supplies, light and power, telephone and telegraph, travel, donations, memberships, and forms of advertising. Employees may use supplies in wasteful quantities and demand expensive kinds when less expensive forms would serve the purpose; lights may be used when not required; machines may be left running when not in use; telephone and telegraph service may be used when mail service would be as effective; travel costs may become exorbitant; and expenditures for donations, memberships, and advertising may be excessive. Even among fixed overhead costs such as rentals and depreciation, frequently management can make readjustments that result in savings. When rentals are high, new leases can be secured; depreciation of fixed assets can be reduced through efficient purchasing and repair policies.

Cost accounting records should exhibit overhead costs by type and by departments. Thus cost accounts are maintained to show the total amount of each class of overhead such as indirect labor, supplies, taxes, depreciation, insurance, and rent. From these accounts each cost is classified by departments. A careful study of overhead by type and departments made monthly by the comptroller and other officials should result in the curtailment of unnecessary costs and in the maintenance of overhead costs at a subsistence level.

Managerial Problems in Dealing with Overhead Costs. Cost accounting has reached a stage of development which enables it to supply management with detailed statistical information regarding production costs and prices of products. Timely and intelligent use of such information may make it possible for management to effect adjustments which result in increased efficiency and, consequently, in larger net profits. Internal conditions within an individual concern and external conditions in the industry or in national markets may prevent the realization of most efficient production and maximum profits, but, through the proper understanding of overhead costs, it is possible for the management to work more intelligently toward that goal.

Among the problems of overhead costs with which management must deal are the following:

a. Decreasing cost conditions—idle capacity.
b. Variety of products.
c. Extension of territories.
d. Price differentials.
e. Size of the business unit—contraction and expansion policies.

Decreasing Cost Conditions—Idle Capacity. The vast majority of business concerns are subject to decreasing cost conditions up to the point where production reaches the optimum capacity of the plant and equipment. This economic condition is true largely because of the fact that overhead costs do not increase appreciably with an increase in the number of units produced. The cost per unit of product decreases as the quantity of production increases, since there is a decrease in the share of overhead costs chargeable to each unit produced.

The goal of every manager is to operate his business at a constant rate and at a level of production which approximates full plant capacity, but such an ideal situation is seldom approached. Idle capacity, the thing most feared by all businessmen, is a condition applicable to all types of business and may be reflected in higher prices paid by consumers or, as an exaggerated condition peculiar to certain types of businesses, may be borne by producers in the form of high costs and smaller profits. Idle capacity results from four forms of business disease: lack of planning or poor scheduling of work; overexpansion of industries and individual concerns within an industry; seasonal conditions; and irregularities of the business cycle. While losses attributable to idle capacity cannot be eliminated entirely, they can be minimized through the analysis of situations in individual plants. If the concern is carefully departmentalized, cost accounting records can be prepared to reflect the cause and to determine the official or department responsible for the inefficiency. The cost department can prepare reports showing the hours of idle time for each department and the amount of overhead applicable thereto. Idle machines and equipment can be reported for each department, with a notation of causes such as improper scheduling of work, lack of material, machine breakdown, overexpansion of plant or lack of sales, seasonal conditions, and the business cycle.

If the analysis of idle capacity conditions discloses that an important cause is lack of planning or poor scheduling of work, lack of materials or machine breakdown, management can fix responsibility and take steps to change the existing situation. If it is discovered that overexpansion of plant or lack of sales is a cause, it may be necessary to inaugurate new selling policies such as lower prices, additional advertising, development of new territories, or production of new lines of products.

Seasonal conditions prove more difficult of solution. Some manufacturing concerns have found it possible to produce the same quantity of their finished products each month of the year by storing the production in warehouses during slack seasons of sales and depleting the stock in the peak sales months. Types of concerns, such as retail furniture stores, have special sales during July and August. Beauty parlors, restaurants, and theaters offer special services such as air conditioning or summer rates. The ideal situation is to have such a varied line of production or merchandise that some items are in season at all times of the year.

Idle capacity, which is a part of the irregularities accruing from the business cycle, is the most difficult problem of management. The sudden changes in demand due to financial crises are unpredictable. Since nearly all industries suffer alike, the maintenance of adequate financial reserves; insistence upon strict economy in labor, materials, and overhead costs; and an effort to obtain new business are the only precautions available to the management of an individual concern.

Variety of Products, Extension of Territories, Price Differentials. In an endeavor to absorb overhead costs, management may resort to a number of business practices, *viz.*, a variety of products, extension of trade territories, and differential prices.

It is noticeable that business concerns constantly attempt to increase the number of lines of products that are offered for sale. Drugstores have extended their operations until they are in reality department stores, with a variety of departments varying from hardware to restaurant service. Packing plants have extended their service to include butter, eggs, canned vegetables and meats, and numerous by-products of slaughtering operations. Thus management may add new lines of products for the purpose of spreading overhead costs over a larger number of units, which may result in increasing profits from existing lines even though profits are not realized on new classes of products. It is advantageous to produce any new line of product which will earn an income sufficient to cover its direct costs and a portion of the overhead cost of the concern.

Another means of spreading overhead costs over a greater volume of units sold is to widen the sales area. Salesmen's activities and direct mail operations can be carried into new states, to new classes of buyers, and even to foreign markets. Local companies may attempt to extend their trade territories to the entire state, then to neighboring states and national markets through the media of salesmen, mail, or radio. Within a given territory, by varying sales methods and sales appeals, it is possible to broaden the consumer aggregation to include various classes of income groups. The competition among producers for foreign markets has been due largely to the desire to obtain a greater volume of sales and to reap the gain made possible by a decreasing cost per unit of production. Thus automobile concerns, manufacturers of office appliances, producers of rubber goods, packers of food products, and numerous other types of manufacturers have invaded foreign markets in spite of heavy tariff duties.

Probably the most effective method of extending business operations yet devised is through a variety of types of price differentials, including dumping, differentials between localities, different classes of buyers, service, or time. Price differentials are a means of obtaining a larger volume of sales. The greater the volume, the wider is the base of production or sales over which overhead costs can be spread.

Size of the Business Unit—Contraction Policies. In order that a business enterprise may continue to operate indefinitely, it is necessary that the prices charged should cover direct materials or cost of the merchandise, direct labor, and overhead costs. Temporarily, during periods of depression or of business adjustment, a concern may continue to operate so long as its revenue is enough to cover direct costs plus the amount of variable overhead costs, because a portion of overhead costs remains constant whether or not the business is being operated. An analysis of income in relation to direct costs and variable overhead costs may be used to determine whether it is more advantageous to operate or to liquidate the business enterprise.

When a cost analysis discloses that certain lines of products, departments, or territories are profitable and others are not, there arises the question of policy in regard to unproductive units or divisions. Overhead costs are a prime consideration. Assuming that overhead costs are distributed over all lines and divisions, if an unprofitable product, department, or territory is discontinued, it is likely that overhead costs will not be reduced materially and that the total overhead will have to be redistributed to the remaining units and divisions. The consequent reapportionment of overhead costs will force other units and divisions to bear a larger share, which may cause a loss to be recorded for one or more of them. Even though a line or division is operated at a loss, it may be maintained as a functioning unit so long as its revenue covers *direct material, direct labor, variable overhead costs,* the changing range of *semifixed costs,* and a *portion* of *fixed overhead costs.*

Size of the Business Unit—Expansion Policies. An important managerial problem, concerning which the cost accountant can secure valuable cost statistics, is the most economical size of the business unit. Some types of concerns are susceptible to conditions of decreasing cost up to a stage of immensely large-scale production, but others reach a stage of uneconomical operation while still comparatively small operating units. Economical expansion is largely a condition of overhead costs. If additional production or merchandising activities can be added without a corresponding increase in overhead costs, it is profitable to expand, since, with an increase in the number of units produced and sold, the cost of overhead per unit decreases. If in a department store a department selling a new line of merchandise can be added without acquiring new building facilities, overhead costs can be distributed over a larger volume of sales to the advantage of each of the other operating departments. If in a factory an additional product can be processed with existing machinery and plant equipment, or a new line of products can be manufactured with the same equipment during hours, days, or seasons when the production of major products is at a low ebb, the production costs of all types of units is lowered owing to a reallocation of those overhead costs which remain relatively constant.

When additional departments or processes necessitate an expansion in plant and equipment, the problem arises as to whether or not the additional business will be profitable, either immediately or over a period of time. There develops a race between an increase in the volume of revenue and of overhead costs. Will the expansion mean an increase in depreciation, taxes, rent, power, indirect materials, and supervision in a greater amount than the anticipated increase in revenue from the added operations? If the new business can absorb all the additional overhead costs, then the other lines and departments will not be penalized by the expansion. If it cannot, a temporary or permanent decrease in net profits from other departments and lines must be accepted.

In any business enterprise there is constant experimentation with different functions. New business should be planned after a careful study has been made of the additional overhead costs which such additional activities will entail. Recently, in a Middle Western city, a large manufacturing concern was planning to build an extensive addition to its plant facilities. The management presented to the cost accountant blueprints and estimates of costs covering the building, equipment, and machinery to be required if the project were completed. The plans were so complete that they included the placement of every machine and a classified list of the labor and supervisory force required to man the plant. Assuming a given quantity of production, the cost department was given the task of computing estimates of the overhead costs of operating each department in the proposed project. The direct material, direct labor, and overhead costs per unit of product were estimated, the project was completed, and it was found that the actual costs of operation closely paralleled the estimates.

Another problem closely connected with the growth of business enterprises is whether it is more profitable to increase the activities of a single plant, to build a series of similar enterprises as a horizontal combination, or to divide the enterprise into specialized divisions, each contributing to the final product as a form of integration. The selection of the most profitable form of business expansion is dependent upon such factors as overhead costs, location, public policy, and legal requirements.

ACCOUNTING FOR AND DISTRIBUTION OF OVERHEAD COSTS

Problems in Distribution of Overhead Costs. Cost accounting is largely the scientific distribution of costs to such business units as departments, territories, lines of products, units of production, and individuals or groups of employees; the purpose is to distinguish profitable from unprofitable activities and to test the efficiency of functioning divisions and of personnel groups. There are complications in the allocation of direct material and direct labor to divisions and units of production, but the most complex problems of cost accounting revolve around the measurement and distribution of overhead costs.

The cost accountant is searching constantly for equitable bases to distribute various elements of overhead cost to units and divisions of the business enterprise. Since overhead costs cannot be identified with particular units of production and since there are no accounting or statistical means of exact allocation, each element of overhead must be analyzed in the light of the circumstances existing in a particular business enterprise. In the majority of enterprises equitable bases are needed to apportion overhead costs to departments, processes, jobs, lines of products, and sales territories.

General Methods of Apportioning Overhead Costs. Four general methods, better termed "philosophies" or "points of view," which are the foundation for the determination of distribution bases for overhead costs, are as follows:

a. Service or use.
b. Analysis or survey of existing conditions.
c. Ability to pay.
d. Efficiency or incentives.

A single concern may use one method predominantly or may use all four, each for a particular phase of activity.

Service or Use Method. Service or use is the most common basis for the apportionment of overhead costs to departmental divisions and units. It is based on the theory that the service received can be conveniently measured and that the greater the amount of service or benefit received by a department or unit from a phase of overhead activity, the larger the share of the overhead created by the maintenance of that activity should be borne by that department or unit. Thus depreciation, insurance, and taxes on equipment can be charged to departments on the basis of the time each department used such equipment; overhead costs of the building can be distributed on the basis of space occupied by each department; and units of production may be charged an amount of departmental overhead in accordance with the time required for servicing or processing in the department. The method is considered consistent and fair, but it requires more accounting than do other methods since each piece of equipment must be identified with departments and the time element must be accounted for by departments, production orders, or units. Examples of service or use bases are given in Exhibit 44, page 125.

Analysis or Survey Method. The method of allocating overhead costs according to an analysis or survey is used frequently to distribute certain types of overhead that are not closely related to divisions and units of a business and whose remoteness necessitates an arbitrary distribution. For example, salaries of officials such as the president of a company whose activities are varied and not closely related to individual departments or divisions can be distributed upon the basis of an analysis of all factors involved. Thus a survey may reveal that the president's activities may be largely concerned with sales and with developing new territories, in which case a larger percentage of his salary should be charged to the sales division than to manufacturing.

The delivery department for a department store is so varied in its service to sales departments that a single basis for the distribution of the total cost of maintaining the delivery service to sales departments is unsatisfactory. In analyzing the situation, consideration must be given to the number of packages delivered, the size and weight of items transported, the number of deliveries and pickups made, and the mileage traveled. A survey of all these factors, with weight given to the more important ones, may be necessary in order to arrive at a percentage of the total overhead cost of the delivery service chargeable to each sales department. Such a survey need be made only at irregular intervals in order to obtain a sample or cross section of the prevailing conditions. A new analysis is necessary only when conditions underlying the original study have changed substantially.

Other illustrations of this method are found in the allocation of electric light to departments on the basis of a survey of the number of lights, size, and estimated hours of use for each department; and in the distribution of elevator cost to departments on the basis of a survey of the number of passengers using elevators during typical hours and days.

Ability-to-pay Method. The ability-to-pay principle as a basis of distributing overhead costs is similar in its application to the theory of taxation which holds that those individuals or organizations which have the greatest income shall bear the highest proportion of the tax burden. In cost accounting distributions, those departments, territories, lines of products, or units having the largest income may be charged the largest amount of overhead, the allocation being on a proportional basis. Either gross income or net income may be used as a basis of distribution. In ascertaining the profitableness of each salesman's activity, the total overhead costs of maintaining a sales territory can be distributed to salesmen in the territory on the basis of net sales attributed to each salesman. The ability-to-pay principle offers a base which is easily applied, but it is generally considered inequitable because it penalizes the efficient and the profitable units of a business to the advantage of the inefficient ones. For example: if in a department store the manager of each sales department receives as compensation a percentage of the net profits shown for his department and if executive salaries and general office costs are charged to departments on the basis of net sales, the most efficient manager's department would be allocated a proportionally larger share of the overhead costs and his share of profits would be proportionally smaller than that of a less efficient department manager.

Efficiency or Incentives Method. The efficiency or incentives method is the newest approach to the scientific distribution of overhead costs. Although still in the experimental stage it is being applied as a part of modern cost accounting plans to modify older ideas of fair distribution. Efficiency is measured by such managerial devices as budgets, standards, and quotas. A budget, which contains the estimate of the sales expected of a department in a department store for a stated period of time, can be used as a basis of distributing overhead to the department. An incentive is introduced because each department manager aspires to reach or to exceed the volume of sales budgeted for his department. If he surpasses his budget, the overhead costs assigned to his department are spread over a larger volume of sales and the cost per unit or dollar of sale is lowered; if he falls below the volume budgeted to his department, there will be an increased cost per unit or dollar of sale because overhead costs are assignable to a smaller volume.

In manufacturing concerns standard costs have been introduced as a means of apprising management as to the operating efficiency of workers, processes, and departments. Standards are determined for direct material, direct labor, and overhead costs. In setting standard overhead costs, it is necessary to scrutinize each item in advance of the fiscal period and to determine the amount of overhead which is necessary to efficient production. The total is broken down into standards for overhead for each hour or other unit of production. Overhead in excess of standard is transferred to Profit and Loss and is not incorporated in the cost of production.

In the case of sales agencies, sales quotas are set for each territory and selling overhead costs are distributed on the basis of predetermined sales quotas.

Control Accounts for Overhead Costs. Overhead costs are recorded in books of original entry where they are charged to controlling accounts such as Factory Overhead Control, Selling Cost Control, and Administrative Cost Control. The overhead costs requiring cash disbursements may be vouchered and entered in a voucher register where columns may be provided for each of the control accounts. Noncash items are recognized by adjusting and closing entries recorded in the general journal at the end of each accounting period. Some overhead costs can be charged directly to the three controlling accounts; other overhead costs must be allocated by equitable distribution bases. Illustrations of overhead distributions are given below.

A repair invoice for $155 received from a typewriter repair company contains a list of repairs on equipment in various departments. A voucher may be prepared for entry in the voucher register as follows:

Factory Overhead Control	$80	
Selling Cost Control	60	
Administrative Cost Control	15	
Vouchers Payable		$155

The preparation of a voucher for the monthly power and light statement illustrates an overhead cost which requires an apportionment to overhead control accounts based upon meter readings or a survey of consumption factors for the three divisions of an enterprise. The entry in the voucher register for a $450 statement is as follows:

Factory Overhead Control	$200	
Selling Cost Control	150	
Administrative Cost Control	100	
Vouchers Payable		$450

Rent represents an item that may be paid in advance and charged to a Prepaid Rent account when vouchered. If $7,200 is the annual rental of leased property, the following entry may be made in the voucher register at the time the yearly payment is made in advance:

Prepaid Rent	$7,200	
Vouchers Payable		$7,200

An adjusting entry would be made in the general journal at the end of each month to amortize the expired amount of rent prepaid. The service or use method, based upon the amount of floor space occupied by the different divisions of the business, may be used to apportion the cost. The general journal entry would be

Factory Overhead Control	$500	
Selling Cost Control	50	
Administrative Cost Control	50	
Prepaid Rent		$600

Indirect materials or supplies may be used as an example of an overhead cost that is charged directly by requisitions to each division of the company. A summary of the material requisitions, showing the total amount of factory, selling, and administrative supplies used during the month, is entered in the general journal as follows:

Factory Overhead Control	$400	
Selling Cost Control	700	
Administrative Cost Control	500	
Materials Control		$1,600

Subsidiary records, frequently termed "standing orders," provide a detailed analysis of the various costs that are shown in total in the foregoing control accounts. The relationship between an overhead control account and subsidiary records, with entries and postings from the voucher register and journal, is illustrated in Exhibit 43, Chart of Factory Overhead Control Account and Subsidiary Records.

Many special problems in connection with accounting for factory, selling, and administrative overhead are considered in detail in subsequent chapters.

Distribution of Overhead Costs in Manufacturing Concerns. In enterprises where an average cost per unit of the manufactured product is obtained, overhead costs are distributed by means of selected bases to service departments and processes, and the total overhead cost of each service department is redistributed to the processes.

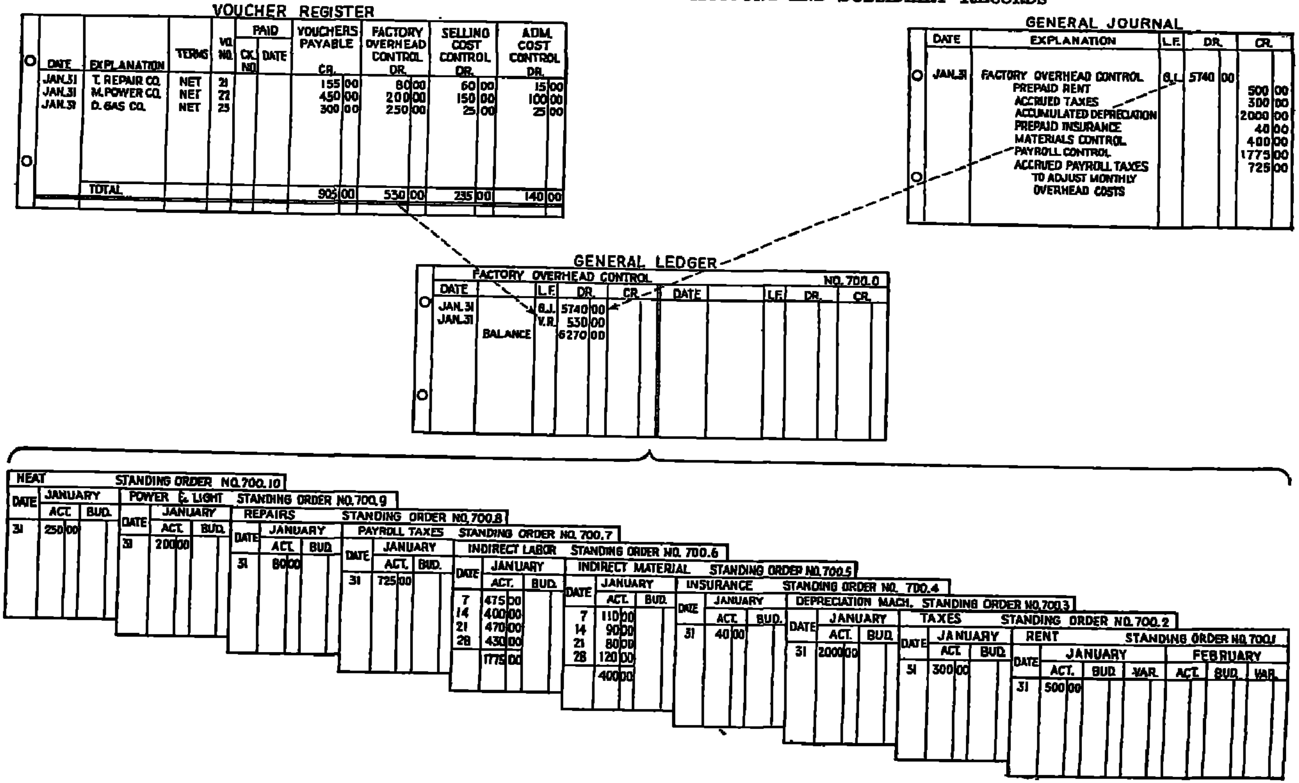
In manufacturing concerns where it is practicable and advantageous to obtain costs for each job, the allocation of overhead costs involves the selection of three groups of distribution bases: (*a*) bases for the distribution of overhead costs to service and production departments; (*b*) bases for the apportionment of service departments' overhead costs to other service departments and production departments; and (*c*) bases for the distribution of production departments' overhead to job order cost sheets. The selection of the proper bases is a matter of judgment, due consideration being given to the circumstances and conditions within each enterprise.

Some of the common overhead distribution bases frequently used in manufacturing enterprises are listed in Exhibits 44 to 46.

Overhead Distribution for Sales Divisions. Selling agencies or sales divisions of manufacturing concerns have complicated problems in the distribution of overhead selling costs to departments, territories, and

Exhibit 43

Chart of Factory Overhead Control Account and Subsidiary Records



VOUCHER REGISTER

DATE	EXPLANATION	TERMS	VO. NO.	PAID CK. NO.	PAID DATE	VOUCHERS PAYABLE CR.	FACTORY OVERHEAD CONTROL DR.	SELLING COST CONTROL DR.	ADM. COST CONTROL DR.
JAN.31	T. REPAIR CO.	NET	21			155 00	80 00	60 00	15 00
JAN.31	M. POWER CO.	NET	22			450 00	200 00	150 00	100 00
JAN.31	D. GAS CO.	NET	23			300 00	250 00	25 00	25 00
	TOTAL					905 00	530 00	235 00	140 00

GENERAL JOURNAL

DATE	EXPLANATION	L.F.	DR.	CR.
JAN.31	FACTORY OVERHEAD CONTROL	G.L.	5740 00	
	PREPAID RENT			500 00
	ACCRUED TAXES			300 00
	ACCUMULATED DEPRECIATION			2000 00
	PREPAID INSURANCE			40 00
	MATERIALS CONTROL			400 00
	PAYROLL CONTROL			1775 00
	ACCRUED PAYROLL TAXES			725 00
	TO ADJUST MONTHLY OVERHEAD COSTS			

GENERAL LEDGER

FACTORY OVERHEAD CONTROL NO. 700.0

DATE		L.F.	DR.	CR.	DATE		L.F.	DR.	CR.
JAN.31		G.J.	5740 00						
JAN.31		V.R.	530 00						
	BALANCE		6270 00						

HEAT STANDING ORDER NO. 700.10

DATE	JANUARY ACT.	JANUARY BUD.
31	250 00	

POWER & LIGHT STANDING ORDER NO. 700.9

DATE	JANUARY ACT.	JANUARY BUD.
31	200 00	

REPAIRS STANDING ORDER NO. 700.8

DATE	JANUARY ACT.	JANUARY BUD.
31	80 00	

PAYROLL TAXES STANDING ORDER NO. 700.7

DATE	JANUARY ACT.	JANUARY BUD.
31	725 00	

INDIRECT LABOR STANDING ORDER NO. 700.6

DATE	JANUARY ACT.	JANUARY BUD.
7	475 00	
14	400 00	
21	470 00	
28	430 00	
	1775 00	

INDIRECT MATERIAL STANDING ORDER NO. 700.5

DATE	JANUARY ACT.	JANUARY BUD.
7	110 00	
14	90 00	
21	80 00	
28	120 00	
	400 00	

INSURANCE STANDING ORDER NO. 700.4

DATE	JANUARY ACT.	JANUARY BUD.
31	40 00	

DEPRECIATION MACH. STANDING ORDER NO. 700.3

DATE	JANUARY ACT.	JANUARY BUD.
31	2000 00	

TAXES STANDING ORDER NO. 700.2

DATE	JANUARY ACT.	JANUARY BUD.
31	300 00	

RENT STANDING ORDER NO. 700.1

DATE	JANUARY ACT.	JANUARY BUD.	JANUARY VAR.	FEBRUARY ACT.	FEBRUARY BUD.	FEBRUARY VAR.
31	500 00					

EXHIBIT 44

DISTRIBUTION BASES FOR ALLOCATION OF OVERHEAD TO SERVICE AND PRODUCTION DEPARTMENTS

Overhead Cost	Bases of Distribution
Labor	Labor cost in each department
Materials and supplies	Actual costs of supplies requisitioned by each department
Liability and compensation insurance	Number of employees, or classification of employees according to risk or insurance rate for each department
Repairs	Actual repair costs in each department
Telephone cost	Number of telephones in each department
Depreciation on building	Square feet or value of space occupied by each department
Depreciation on machinery and equipment	Valuation and rate of depreciation on the machinery and equipment in each department
Rent	Square feet or value of space used by each department
Taxes on equipment	Value of equipment in each department

EXHIBIT 45

BASES FOR THE DISTRIBUTION OF SERVICE DEPARTMENT OVERHEAD COSTS TO OTHER SERVICE DEPARTMENTS AND PRODUCTION DEPARTMENTS

Service Departments	Bases of Distribution
Employment department	Rate of labor turnover or number of employees in each department
Janitor service department	Square feet of floor space and window space in each department
Maintenance and repair department	Charge directly on the basis of the hours worked for each department
Payroll department	Total labor hours or number of employees in each department
Stockrooms	Number of requisitions, quantity, or value of materials required by each department
Superintendent's office	Total labor-hours in each department or on basis of a survey of service rendered to each department
Trucking department (inside the plant)	Units carried, tonnage, and trucking hours of service for each department
Welfare department	Number of employees in each department

EXHIBIT 46

BASES FOR THE DISTRIBUTION OF PRODUCTION DEPARTMENTS' OVERHEAD COSTS TO JOBS

Bases of Distribution
Percentage of direct material cost
Percentage of direct labor cost
Percentage of prime cost
Production in terms of units
Direct labor-hours
Machine-hours

salesmen. Selling costs such as general advertising, travel, supplies, salaries, and telephone and telegraph are assignable to sales service departments and territories according to the service rendered through the use of selected bases. As a secondary distribution, service departments' overhead costs are allocated to sales territories. Subsequently the cost of maintaining each territory may be divided among salesmen, lines of products sold, or accounts of customers, depending upon the amount of detailed costs desired for each territory.

EXHIBIT 47

SUGGESTED BASES FOR THE DISTRIBUTION OF SELLING COSTS TO SALES DEPARTMENTS AND TERRITORIES

Selling cost	Standing orders charged	Distribution base
National radio advertising	Territories	Population coverage of territories by radio network
Catalogues	Territories	Sales; number of customers
Selling salaries	Sales departments and territories	Actual salary expenditures for each division
Commissions and bonuses	Territories	Actual commissions and bonuses earned by the personnel in each division
Travel	Sales departments and territories	Actual travel for the personnel in each department or territory
Shipping costs: freight, cartage, boxes, and packing supplies	Territories	Actual shipping costs for each territory; or sales
Rent of branch or territorial offices	Territories	Rental charge for space used by each territory
Depreciation	Sales departments and territories	Rate of depreciation and value of equipment and property used by each division
Taxes on property	Sales departments and territories	Value of property used by each division

Some of the common bases for the distribution of selling costs to sales departments and territories are listed in Exhibit 47; suggested bases for the distribution of sales service departments' costs to territories are given in Exhibit 48.

Predetermined Overhead Distribution Bases. Overhead costs are incurred daily but generally are not summarized by type of cost until the end of each accounting period. As a step in determining the profit or loss for a month or a quarter, overhead costs are distributed to departments, processes, production orders, or territories, depending upon the type of concern and method of cost accounting in use. Such a procedure entails the accumulation and distribution of actual overhead costs on a historical basis, which is sufficient for many types of concerns but is inadequate where a knowledge of costs is essential in setting prices or in preparing estimates for contracts. Especially in manufacturing and construction concerns, it has been found necessary to know costs for each job before actual processing begins or at least a few hours after the work is completed.

The use of budgets makes possible the determination of estimates of overhead before the beginning of each accounting period. The total estimated overhead is allocated to departments by means of distribution bases, the same bases which are used at the end of the period for the distribution of actual overhead costs. The estimated departmental overhead costs are in turn allocated to production orders through the media of distribution bases so that total costs can be obtained before the end of the period.

EXHIBIT 48

SUGGESTED BASES FOR THE DISTRIBUTION OF SALES SERVICE DEPARTMENTS' COSTS TO TERRITORIES

Sales Departments	Distribution Base
Advertising	Sales or directly in cases of special advertising plans
Dealer and jobber service	Number of dealers and jobbers, or sales
General sales	Sales
Order	Actual number of orders
Sales accounting	Sales or survey of work done
Training school for salesmen	Number of salesmen, or sales
Shipping	Actual number of shipments, number of articles, tonnage
Warehouse	Actual number of orders, number of articles, and tonnage handled

Limitations of Overhead Apportionment.[1] Cost accounting is not an exact science, nor does it produce accurate results according to the standards of statistical analysis. The existence of joint costs in both the production and the selling divisions of business enterprises makes it impossible to compute accurate costs for departments, services, or units of production. Most departments or operations produce two or more products with the same labor, equipment, and supervisory force while neither factory overhead nor selling overhead costs can be identified specifically with particular activities or products.

The prevalence of fixed costs, represented by items of cost that do not vary to any extent with fluctuations in production, further complicates the task of obtaining accurate unit costs. Direct material and labor costs can be identified with units of production and do not vary appreciably from period to period, but the fixed costs must be spread over the production of each period with the result that unit costs will rise during periods when production is low but will be lower when production is increased.

It is apparent that the presence of joint costs and the conditions of fixed costs make the exact determination of the costs of production impossible. As a result, it is necessary for the cost accountant to adopt various bases for the distribution of joint costs, particularly overhead costs, to departments, services, jobs, and units. These bases, already discussed in this chapter, are at best "means to an end" rather than scientific or logical criteria for cost assignment. Furthermore, the selection and application of these methods are the result of conflicting objectives: the aims of the accountants who are interested in accurate income and cost determination and the interests of the management which are directed toward lower costs and more efficient operations.

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[1] For a complete discussion of this subject see W. J. Vatter, *The Accounting Review*, April, 1945, pp. 163–176.

Vatter[1] concluded, in his discussion of the limitations of overhead allocation,

> First, there is a real need for research directed toward the establishment of principles for cost allocation, especially with regard to the allocation of overhead costs. . . . Second, there is good reason for broadening the concepts that have been applied to the field of cost accounting, to embrace techniques of statistical and mathematical analysis. . . . Third, and most important, the limitations of available methods, the compromises of expediency, and the conflicting objectives that enter into cost calculations should make the accountant more careful as to his terminology with respect to unit costs.

In spite of the limitations of overhead distribution, cost accounting is an important tool in guiding management in determining policies regarding efficient operations, alternative methods of production and sale, plans for expansion or contraction, and prices. The performance of individual workmen, machines, departments, and plants can be analyzed from the accumulated cost data. Its value to stockholders, creditors, and supervisors of plant operations is signified by the comparisons and trends that can be observed from the cost data from period to period.

[1] *Ibid.*, p. 127.

CHAPTER VIII

BUDGETING—TECHNIQUE AND GENERAL PROCEDURE

Budgeting plays an important role in the development and use of modern cost accounting systems in all types of business enterprises. Budgetary control is planned to assist management in the allocation of responsibility and authority, to aid in making estimates and plans for the future, to assist in the analysis of the variations between estimated and actual results, and to develop bases of measurement or standards with which to evaluate the efficiency of operations.

This chapter is concerned with general principles and procedures of budgetary control. Later chapters contain detailed discussions of the essential relationships between budgeting and cost accounting and show how these two managerial devices can be coordinated and interrelated into a unified, efficient tool in the manufacturing, distributing, and administrative divisions of business enterprises.

The use of flexible budgeting in accumulating cost data for the purpose of aiding management in formulating plans and making sound business decisions is explained and illustrated in Chap. XXII.

Economic Significance of Budgeting in Business Enterprises. If one is a believer in the merits of competition, it follows that, over a period of time, economies which may be brought about in the individual firm will result in lower costs of production, distribution, and administration and that competition will force producers to pass on such economies, in the form of lower prices, to consumers. If this is true and if effective budgeting within the individual concern can be proved to be one means of bringing about greater efficiency, eventually consumers will receive the benefit of this managerial device.

Every student of economics is familiar with the principle of proportion, so no detailed explanation is necessary. Every entrepreneur endeavors to obtain the best combination of the agents of production, the most effective proportions of various types of labor, capital goods, raw materials, and managerial ability. The producer thinks in terms of unskilled labor, skilled machine operators, foremen, department heads, office workers, salesmen, supplies, tools, machinery, and equipment. He finds that each of these factors has a price which is determined by market conditions over which he has no direct control. If one factor, such as machinery, commands a high market price and another factor, labor, is plentiful and relatively low in price, management will use a combination of large amounts of labor and small portions of capital goods or machinery. The greater the cost of one agent as compared to others, the more sparingly the higher cost factor or agent will be used in order to secure a finished product with the least cost per unit. The manager will continue to add each of the various factors so long as each one pays for itself, *i.e.*, until the point of marginal productivity is reached, when the cost is equal to the return from the use of that factor.

Production in any manufacturing industry is a roundabout process. Some time elapses between the time of acquiring and adding the factors and the completion and sale of the finished product. The most profitable proportions of various productive factors can be ascertained only through careful experimentation and planning. It is after various experiments have been made and all available data have been reviewed that budgeting or planning becomes an important managerial tool. The budget is a detailed schedule of the proposed combination of the various factors of production which the management deems to be the most profitable for the ensuing period.

As corollaries of the broad principle of proportion, or of the selection of the most profitable combination of factors of production, more specific advantages may be attributed to budgeting. The budget is a coordinating device, since it shows management the proper relationship of the operations and policies of each of the various departments of the divisions of sales, production, administration, and finance to broad managerial policies of the concern. Costs may be reduced, wastes prevented, and the proper relationship between income and costs may be established. Since planning results in a more profitable combination of the factors of production, the budget becomes of economic value because it results in lower costs and greater net profits to entrepreneurs and, eventually, may lower prices to consumers.

Stabilization of Industry through Budgeting. In many concerns budgeting has aided in a controlled production and has tended to eliminate seasonal variations. Whenever the disturbance of operations and employment is reduced and a more constant rate of production is scheduled per working day, week, or month, there accrues an economic gain to the concern, to labor, and to the public.

The manufacturer usually has two relatively constant elements, *viz.*, management and investment in fixed capital in the form of equipment, machinery, and buildings. Only when each is used to full capacity and at an even pace is the greatest benefit obtained. In most concerns the executive payroll remains relatively fixed in amount, even though production and sales schedules are subject to violent fluctuations from month to month. Throughout each division and department, the keymen in the executive force must be retained so long as there is any flow of production through the plant. Executives are not so efficient or useful to the concern when they are comparatively idle a few months of the year and then are forced to work long hours, under great stress, during peak production months or seasons. Equalizing production throughout the year results in maximum utilization of managerial ability.

It was explained in the preceding chapter that there is a tendency for overhead costs to increase in the majority of enterprises. The demand of peak seasons encourages additional investments in plant and equipment and the replacement of workmen by expensive machinery. Normally most plants are operated to capacity only a few months of each year and it is difficult to adjust items of overhead cost in proportion to changing production.

Whenever a laborer is laid off, due to seasonal or periodic variations in the production of the plant, there is an individual and social waste involved. There is loss to the plant because every worker has a certain share of the total overhead of the plant assignable to his work, and, if he is not producing, that fixed cost must be assigned to a smaller production, raising the total costs per unit. Likewise each worker has time and money invested in specialized training which can be employed most efficiently only in the occupation for which he is trained. If he is unemployed, his productive efficiency is a waste; if he must transfer his energy to another type of industry, his productive efficiency is greatly curtailed. In either case the community must bear the burden in the form of deteriorated working power, lower production, higher costs, and perhaps in the support of the worker and his family as public charges for a period of time. The concern also suffers indirectly from reduced profits caused by higher costs and a lowered demand resulting from lessened purchasing power of laborers.

Budgetary control is an important factor in the stabilization of production in a number of industries. A large soap manufacturing company is an outstanding illustration of effective production planning. Budgets are made for 1 year in advance. After the sales for the entire period are forecasted, the desired production of various products is planned so that the same quantity of product will be manufactured each working day of the year. Each day of plant operations the same number of workmen are employed and plants, machinery, and equipment are used for an equal number of hours at a constant rate of speed. Contracts are entered into with workmen a year in advance, with a guarantee of a definite number of working days and a fixed number of hours per day. Since the production scheduled is constant throughout the year, warehouses are filled during months when the quantity of products manufactured exceeds the sales and the excess production is disposed of during peak sales months. Such stabilized production should be the goal of every manufacturing enterprise because of the economic benefits which accrue to the firm itself, to labor, and to the public.

Organization of the Enterprise for Budgetary Control. Before a system of budgetary control can be successfully installed, it is necessary that the organization of the firm be so devised that all lines of authority and responsibility are definitely allocated and defined. The system of budgetary control provides for the separation of functions and the division of responsibility and requires that the organization be planned so that each supervisor, from the president to job foreman, will have his duties definitely outlined.

Generally the best procedure is to divide the business into the three main functions of distribution, manufacturing, and administration. The main office selling division may be separated into such departments as advertising, sales supervision, shipping, credit, collection, and sales accounting, while the selling force in the field may be divided into definite branches, agencies, or territories. The manufacturing division is usually divided into service departments, such as receiving, stores, purchasing, cost accounting, and maintenance, and production departments which are the centers where actual processing is done. A production department may be a large department, including a number of operations or types of work, such as punch press or assembly, or it may be a machine center or operation under the supervision of a job foreman. The administrative division may be divided into such departments as executive office, general accounting, correspondence, and payroll.

Every concern should have an organization chart which shows graphically the main divisions, subdivisions, departments, and territories, and the functions and duties to be performed by each division or department head. In large organizations a manual of budget procedure should serve as a helpful guide in the establishment and maintenance of a system of budgetary control.

In a few concerns the comptroller or other major executives prepare budget estimates and submit them to departmental executives for revision or approval. In the majority of concerns departmental executives prepare the initial estimates for their departments. This seems the better method because the individuals who are responsible for the performance and enforcement of the estimates are the ones who should originate them. The department heads and their subordinates, with the cooperation of the executive office and the accounting departments, are best able to make estimates since they are in close touch with the existing conditions within their departments. It seems desirable that a budget committee be formed to act in an advisory capacity. The committee should be composed of one or more executives from each of the important divisions of the business. During the period of budget preparation, meetings of the budget committee with departmental executives should be frequent, perhaps daily.

General Procedure in the Preparation of a Budget. After the organization has been prepared for a budget program, the task of preparing the budget estimates is undertaken. The usual plan is to have the executive or executives in charge of the budget work create standard budget forms on which production plans, estimated income, and costs may be inserted for each department and division. There should be a central office, preferably the accounting department, to handle the mechanics of the work.

The accounting department should be asked to submit reports for the past few years, showing a comparison of production costs, income, and expenses by subdivisions and departments. An analysis of general business and market conditions should be made with the aid of the statistical department or from data supplied by commercial statistical forecasting agencies and government and trade reports. Conditions in each sales territory should be analyzed, and future sales possibilities ascertained. Sales and production reports, current market and trade data, and estimates of future sales in the territories should enable executives to formulate general policies and plans for the budget period.

A series of conferences between each department and division head and the executive in charge of budgeting or the budget committee are held, during which general operating policies of the concern are reduced to department and division plans. The actual departmental budget estimates are then prepared, and, after being revised and authorized by executives in charge of budgeting, they become the standards of performance for the budget period.

Length of the Budget Period. Each individual concern has a tendency to react in a definite way to general business and market conditions, and it is necessary that records of past performance and conditions peculiar to the concern and to the industry be related to the most reliable market indices available. The budget forecast should include sales possibilities, probable prices of materials, labor conditions, and, if new working capital is to be needed or new financing is anticipated, a forecast of conditions in the financial markets. When market and business conditions are rapidly changing, forecasts for a long period of time lead to great inaccuracies. Consequently the relative stability of general business conditions is an important factor in the determination of the budget period. Since the majority of manufacturing establishments are subject to seasonal variations in their selling and production, it is advantageous for comparative purposes to have the budget period cover the normal business period or a complete cycle of operations.

The plan of using two periods for budgetary control, a long period usually from 1 to 3 years and a short period ranging from 1 to 3 months, is being successfully employed by a number of concerns. The long-term budget consists of general estimates, including seasonal variations, which permit the formation of general operating plans and policies. The monthly or quarterly budgets contain detailed estimates of operating costs and income which permit the comparison of actual and estimated accomplishments and a careful analysis of the variations. The short budget periods permit the making of adjustments to meet changing market and business conditions.

Thirteen-period Business Calendar. Budgetary control is handicapped by the use of the present 12-month calendar. The majority of establishments close their accounting records monthly, with monthly comparisons being made between actual and estimated performance. The comparison of accounting data and performance must be between identical periods of time to be of the greatest value. The present calendar arrangement requires expensive and time-consuming reconciliations of monthly statements and budgets before successful comparisons can be made. The length of the month may be 28, 29, 30, or 31 days, and, with the exception of February, each month contains 4 weeks plus 2 or 3 days. The date of a given month each year falls on a different day of the week from the preceding year, and this fact complicates record and payroll preparation. To avoid these complications, more than 650 companies in the United States and Canada have adopted the 13-month calendar. Under this system the year is divided into thirteen 28-day months, with 4 weeks of 7 days each in every monthly period. Many concerns use the 13-month calendar for all internal records, but use the regular 12-month calendar in their dealings with the public.

Many advantages are attributed to the use of the 13-month calendar. When budgetary control systems are in use, valuable comparisons can be made because of the standardization and equalization of budget periods. The periodic statistical and accounting reports can be more easily prepared and analyzed because the periods are of equal length and the closing periods always end with the same day of the week. The payroll periods are of equal length, and all the disadvantages of split payrolls are avoided.

In the publication "The Thirteen-period Business Calendar" prepared by the Policyholders Service Bureau of the Metropolitan Life Insurance Company, the most commonly used plans are described as follows:

> Not all of these companies use the same system in dividing the year into thirteen periods nor in allowing for the fact that the number of days in a year (365 in ordinary years and 366 in leap-years) is not exactly divisible by thirteen. In general, two plans are in use. Under one the year always begins on the same day of the week and the extra days are allowed to accumulate for five or six years (depending on the number of leap years in the period) when a fifth week is inserted in the last year. Under the other plan the year always begins on the same date and the extra day or days are included in one of the thirteen periods, usually the last. Each plan has variations. Certain companies, by permitting irregularities in the beginning and closing periods, have each period begin on the same day each year, and have the first period begin on the same date each year.
>
> The most widely used method is that employed by the Eastman Kodak Company. Under this plan the year is divided into thirteen periods of twenty-eight days or four weeks. Each period in every year begins on Sunday and ends on Saturday. The extra days are allowed to accumulate and an extra week is inserted every five or six years.

Incentive Schemes for Budget Performance. A well-developed system of incentive plans for the enforcement of departmental budgets should be formulated before the introduction of the budgetary program. In too many companies careful estimates of departmental activities have been prepared, with no definite plans made to secure their attainment through the proper stimulation of interest and cooperation of employees. Various types of incentives in the form of piece-rates and bonus plans have been used successfully for many years, but they have been planned as stimulants for direct workers and salesmen and have not included executives, office employees, or indirect factory workers. With the introduction of budgetary control it is possible to put into force bonus systems which will include indirect employees.

If carefully planned and administered, financial incentives may be employed as effective means of enforcing budget accomplishment and cost reduction. Budgetary control requires that definite responsibilities and a division of tasks be set for each class of executives, salesmen, office employees, and indirect factory workers. The budgets should be made for a definite period of time and a comparison of actual results with predetermined estimates should be made periodically. Two general principles should be kept in mind when the plan of compensation is formulated. First, the incentive scheme should include only those variable selling, administration, and factory costs, such as sales, advertising, supplies, power, light, travel, salaries, and wages over which the department and division executives have some control. Fixed costs such as depreciation, rent, taxes, and insurance should not be included because of their relatively fixed and unchangeable characteristics. The control of direct material and of labor costs may be omitted from the budget incentive plan, because these items are contained in direct labor piece-rate schemes.

The second important principle to be considered in establishing any bonus plan is that the compensation should be in proportion to the effectiveness of the effort.

One large manufacturing concern, which has many branches and subsidiaries, uses "negative incentives" as a means of enforcing budget accomplishment. The management expects each division and department manager to meet the budget requirements, and, unless unusual circumstances make budget accomplishment impossible, the penalty for not attaining the standard is the loss of the executive's position or a severe reprimand. It is not fitting to call such a plan an incentive scheme.

Positive incentives are in force in a number of concerns. To stimulate the foremen's interest in their budgets, one plan is to set aside a sum, such as $100 a month, to be awarded in prizes for the best examples of budget performance. These prizes may be given as follows: $25 to the foreman saving the greatest percentage of possible costs; $20 to the foreman saving the second greatest amount; third prize, $15; fourth $10; and six prizes of $5 each. While this plan lacks scientific qualities and does not compensate in proportion to the savings incurred, it has the advantage of ease of supervision and is a means of maintaining the interest of foremen.

As a part of the budget system of a tire and rubber company, bonuses are given to each department head for meeting his budget requirements.[1]

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[1] "The Bonus and the Budget," p. 9, Policyholders Service Bureau, Metropolitan Life Insurance Company, New York.

The bonuses are paid once a month and are based on a percentage of the employee's monthly income. The following percentages of monthly income are given for meeting the requirements of the production schedule and each of the variable overhead cost budgets:

	Per Cent
1. For making required production schedule	2
2. Indirect labor cost budget	3
3. Waste budget	2
4. Blemish and repair budget	2
5. Supplies budget	2
6. Maintenance cost budget	2
7. Labor turnover budget	2

The company reports that this system of bonuses has made possible the following significant reductions in operation costs:

	Per Cent
1. Indirect labor cost	40
2. Waste	25
3. Blemish and repairs	40
4. Miscellaneous supplies	10
5. Maintenance	25
6. Labor turnover	15

The use of incentive plans, built on budgetary principles, for compensating salesmen and sales executives need not be discussed in this treatise. The subject of sales quotas and bonus schemes has been treated at great length in textbooks and periodicals.

SALES BUDGETS

Estimating Sales. The estimation of probable sales is the most difficult of any of the budget forecasts, and yet upon the accuracy of these figures depends the success of the entire budget system for a budget period. The determination of sales estimates as well as compilation of these data into budgets is a managerial problem whether actual collection and analysis of data are done at the home office or in district offices. The three main factors or classes of data that should be considered by management in estimating sales are (*a*) information concerning past performance, (*b*) statistics in regard to present conditions within the individual company and in each sales territory, (*c*) data concerning the industry and general business conditions.

The starting point in making a sales estimate is past performance. The sales record for past years, and particularly for the year just ending, should be available to the management in minute detail. The accounting or sales department should furnish reports showing sales of the last and preceding years in terms of classes of products and dollars for each salesman, territory, branch, or agency.

The second essential step in the preparation of sales budgets is the accumulation of data regarding conditions within the company and in each sales territory. The management can obtain a rather vivid picture of sales possibilities through information sent to the home office by salesmen, dealers, and district managers. One plan is to have the men in the field make a survey of conditions in their territories just prior to the beginning of the fiscal year; a better plan is that of obtaining regular reports, monthly or more frequently, regarding business conditions. Internal statistics can be obtained in regard to shipments, numbers and style of finished and partly finished stock for special order or contract, as well as new, canceled, and unfilled orders.

As an aid to the proper understanding of present sales conditions and possibilities, many concerns have periodic market surveys. These surveys help in the determination of sales estimates by territories, especially when new products or specialties are being marketed. The market analysis usually covers three fields: products, markets, and methods of distribution. The investigation of the product should include its characteristics, its present uses, the possibility of creating new demands, main selling points, and suggestions as to improvements in the appearance of the package, trade-mark, or the product itself. In analyzing various markets and trade territories, a study can be made of the character of the market and the nature of demand for the product, including potential customers, their age, race, religion, per capita wealth, and income; existing and probable competition; substitutes in the market; and price, credit, discount, advertising, and sales promotion policies.

The study of distribution methods should include information regarding channels of trade, whether through jobbers, wholesalers, retailers, or directly to customers; suggestions as to the cheapest and most efficient means of transportation; and recommendations regarding the proper organization of the sales department and methods of compensating salesmen and district agents.

There are other factors, popularly termed "business barometers," which should be considered in preparing sales estimates. Many large concerns have their own staff of statisticians who attempt to gather all the possible business indices and to weigh and to relate them into a forecast of market conditions for the industry. The following are important indices of general business conditions:

a. Exchange quotations in regard to stocks, copper, rubber, grains, and cotton.
b. Unemployment conditions.
c. Government crop reports.
d. Steel, coal, and oil production.
e. Wholesale price indices.
f. Bank clearings.
g. Interest rates.
h. Business failures.
i. Corporation earnings.
j. Carload shipments.
k. Shipments to and from foreign countries.

These statistics may be obtained from such United States Government reports as the publications of the Department of Commerce, the Department of Labor, and the Federal Reserve Board; from daily papers, financial journals and publications of large banking and financial institutions; and from private statistical services.

Sales Analysis. Records in regard to past performance, data concerning sales and competitive conditions within the concern and the industry, and statistics indicating general industrial and business conditions are available to management. Upon the ability of executives to relate and to interpret these data and upon their judgment and skill in translating market trends into sales forecasts depend the effectiveness of the system of budgetary control and the success of the operation of the concern for the period involved. Statistics can be supplied and trained statisticians can be employed to explain their use, but final interpretation of the data and the setting of the detailed sales estimates are functions of management.

A common procedure is to analyze the data in regard to each territory and to prepare a territorial budget showing estimated sales in terms of dollars or in classes of products, or in both, for each salesman or district. If possible, sales estimates should be set in terms of quantities of the various classes of products. Since the budgets of all the production departments are based on the sales estimate, difficulties arise if sales estimates are in dollars only and not in terms of quantities of each product or classes of products. The production departments must know the estimated demand for each class of product so that all orders can be filled and finished goods inventories will not be overstocked in some lines and depleted in others. Sales estimates, also, should be studied in regard to classes or types of products which carry the largest margin of profit so that sales budgets can be constructed which will yield the greatest aggregate return. Sales budgets, in terms both of quantity and of dollars, should be broken down into monthly estimates so that sales quotas can be determined for salesmen and coordination can be obtained between sales, production, and inventories of finished goods. Budgets prepared by territories showing monthly estimated sales, in terms of both quantities and dollars by salesmen for each class of product, should be summarized in a master sales budget upon which the compilation of manufacturing and administration budgets depends.

SELLING COST BUDGETS

Classification of Selling Costs. There is no uniformity of opinion among students of accounting theory and practicing accountants as to what items should be included in the distribution cost classification because of differences in sales policies, functions, and activities in different organizations. For example, in some concerns the credit, collection, billing, and shipping departments are under the control of the sales department; in others the shipping department may be under the direction of the manufacturing division and the credit and collection functions under the supervision of the administration division. In still other organizations these functions are performed in branches or territorial offices.

The most commonly accepted accounting principle of classifying costs is to charge distribution with all costs of distributing and selling the product from the time it is put in a salable condition by the production departments until it reaches the wholesaler, retailer, or consumer. Thus the credit and collection functions are considered a part of the distribution process, while the costs of manufacturing the product and putting it in cans, containers, boxes, or barrels in a salable form ready for shipment are classified as production costs.

Selling costs can be divided into three classes:

a. Cost of demand creation and securing orders.
b. Cost of handling orders.
c. Cost of supervision of salesmen.

Under the first class may be grouped such costs as salesmen's salaries, commissions, travel, and all types of advertising. Cost of handling includes all costs of filling orders and collecting the money exemplified by storage, packing, shipping, freight, billing, credit, and collection. Supervision costs are salaries, travel, bonuses paid to the general and district sales managers, general sales office costs, and bad debt losses.

Preparation of Selling Cost Budgets. After sales forecasts have been made, management is in a position to prepare estimates of the amount of selling cost necessary to sell the quantity of products shown in the sales budgets. A budget estimate for each class of selling cost such as advertising, salaries, commissions, demonstrations, and supplies should be prepared by the general sales manager with the help and advice of assistant sales managers and other company executives. The accounting department should present to the sales manager a statement of the amount of each class of cost, broken down by territories and departments, for the past few fiscal periods. District or territorial managers and sales department heads should supply their individual estimates of the necessary expenditures for each class of cost, chargeable to their territories. Other general information such as anticipated changes in transportation rates, taxes, rents, supply costs, and newspaper and periodical advertising rates should be considered in preparing the individual selling cost budgets. The final budgets are presented to the budget director or budget committee for final approval.

Advertising Budget. The advertising budget may be formulated by setting up a definite percentage of past sales or by arbitrarily adding or subtracting a certain percentage based on the advertising cost of the previous periods. Both methods are likely to result in careless planning since they do not give proper consideration to the expected changes in conditions of selling for the period forecasted. The second method, that of arbitrarily adding a fixed percentage to the previous advertising cost, is often necessary when new products are being introduced for which there is no market analysis as a guide, but it should be avoided whenever possible.

A third method is to be preferred. The estimated advertising costs may be based on the estimated or budgeted sales for the coming fiscal period, and an arbitrary amount, for example, 4 per cent of sales, may be appropriated. Many concerns find it advantageous to extend the method further and to allow a specified amount of advertising per unit or class of units of the product which is expected to be sold. This method is much more scientific than are the first two mentioned. It results in the proper coordination of advertising and sales plans, and allows for expected changes in sales conditions; there is also a tendency for management to obtain a more accurate picture of the relationship between advertising cost, selling price, and profit per unit of articles sold so as to make revisions in advertising appropriations as unexpected conditions arise during the budget period. Since the advertising is set as a fixed percentage of sales, any changes in sales will automatically change the amount of advertising cost.

The estimate of advertising is usually prepared by the advertising manager, or by the sales manager with the advice and consent of the budget committee or of other executives. The accounting department should provide detailed information concerning past advertising expenditures. The general sales budget plans will be available also, as well as the general policies of the management in regard to advertising. It is then the function of the person or persons preparing the advertising program to coordinate it with the contemplated sales plans and with general business policies.

The general advertising budget should be prepared in such a form as to show the total appropriation, classified by months and by methods of advertising used, such as radio, newspapers, magazines, and billboard.

Either at the time of preparing the general advertising budget or at a later time, more detailed advertising plans should be formulated. Generally it is necessary to estimate the advertising expenditure by branches or territories for each advertising method. The advertising appropriation may be further divided by products or classes of products.

Salary, Commission, and Bonus Budgets. The budgets for sales salaries, commissions, and bonuses rival the advertising budget in importance and size. The whole problem of compensating the selling force is exposed to rigid examination when the estimates are prepared.

Usually office employees of the sales departments, major sales executives, and district sales managers are paid regular salaries. The nature of the general sales forecast has much to do with the salary scale, especially with that of sales executives. When sales volumes have been increasing from period to period, salaries paid to executives have mounted almost in proportion; but a downward trend of business has usually brought with it a more rapid readjustment of sales salaries than of any other class of compensation.

The sales manager, in preparing the budget for sales salaries, should have before him the detailed payroll sheets, supplied by the payroll or accounting department, which show the salary paid to each individual in every sales department or territory. After the total sales estimates, the general company policies concerning salaries, and the existing salary scales in similar concerns and in business in general have been considered, the sales manager should analyze the work and the salary paid to each individual in every department and territory. A budget should then be prepared showing an estimate of the salaries to be paid monthly to each class of employees in each sales department and in each territory. To this budget there should be attached a list of the employees, giving their names, titles, and estimated salaries for the period.

If sales quotas already have been determined for each salesman and territory as a part of the sales budget and a compensation plan has been agreed upon, a budget of the estimates of the amounts to be paid in the form of commissions or bonuses will not be difficult to prepare. The sales manager can have his staff figure the bonus or commissions that will be paid each salesman if he achieves his quota or sales estimate. A detailed list of the salesmen by territories and the estimated amount of their remuneration should be attached to the budget.

Other Variable Selling Cost Budgets. In addition to the major selling cost budgets described above, it is necessary in most companies to prepare estimates of travel, shipping costs, postage, stationary, printing, telephone and telegraph, repairs, supplies, association dues, and donations.

In preparing the budget of travel, the weekly or monthly reports which the salesmen and sales executives have sent in during the previous fiscal period should be sorted and summarized by salesmen, by territories, and by sales departments. Any changes in personnel in the several districts, new alignments of prospects or of territories, and changes in transportation and hotel rates should be considered in addition to the records of past experience. The completed budget of travel should show detailed estimates for each salesman, territory, and sales department.

Usually the shipping cost budget will consist of estimates of freight-out and shipping supplies. With the sales budget showing the expected sales by products and by territories before him, the traffic or shipping manager can determine estimates of the probable cost of shipping supplies and, from rate schedules, the transportation costs. The shipping budget should show estimates of costs both by products and by territories.

Past experience, as shown by detailed reports submitted by the accounting department, will be the determinant in estimating postage, stationary, printing, and telephone and telegraph. The budget or budgets should be prepared by classes of cost for each territory.

The repair budget will include an estimate of the costs which past experience shows to be necessary and any estimates of the cost of special alterations or repairs planned for sales departments or branches for the period. The budget should be prepared to show the estimated cost by sales departments and by territories.

The supplies budget should exhibit the estimated amount of supplies to be requisitioned by each sales department and by each territory or branch. Past experience and the present policy of the company toward curtailment of supplies will be the determining factors in making the estimates.

It is questionable whether estimated losses on bad accounts and collection costs should be treated as a selling cost or should be included under the caption of administration. In many concerns such expenses or losses are deemed to be the result of the administrative policy in regard to credit granting and to collecting from customers. If the credit and collection functions are under the control of the sales manager, the costs so incurred should be classified as selling costs. Losses due to bad debts over the past few years, the present policy of credit restriction, and the collection difficulties expected during the ensuing period will be considered in making the estimates. The budget should show estimated costs by territories.

Association dues and donations may be budgeted easily since most companies make in advance definite appropriations or plans for such expenditures. The budgets should show the purpose of each expected expenditure.

Fixed Selling Cost Budgets. The preparation of budgets for such fixed costs as rent of sales offices, depreciation, taxes, and insurance is a comparatively easy matter in most concerns. Rental contracts or leases for sales department offices and branch offices and warehouses usually are made at least a year in advance. The budget should list the expected rental charges to be paid for each of the buildings and offices to be used.

When sales equipment is purchased, whether it be a salesman's car or a typewriter, the life of the asset and its resale value at the end of its period of usefulness should be estimated. The budget of depreciation should show each class of asset controlled by the sales department, its location as to department or territory, and the estimated depreciation for the period.

The taxes budget should include estimates of licenses and taxes on automobiles used by salesmen and by deliverymen and taxes on real and personal property controlled by the sales division. In the budget of taxes the property should be classified as to sales departments or territories, and the estimated license or tax should be listed.

The budget of insurance usually will include estimates of automobile and truck insurance and insurance on buildings, fixtures, and equipment which are used by the sales division. The insurance budget should detail the estimated insurance for each class of asset by departments or by territories.

Departmental and Territorial Selling Cost Budgets. In addition to preparing selling estimates classified as to type of cost, it is necessary to reclassify estimated selling costs by sales departments and by territories. At the beginning of the period there should be available to the management of the company a detailed budget, showing individual and total selling costs for every sales department and territory, so that distribution costs can be controlled and estimated profit and loss statements can be prepared for each territory.

The method of classifying the estimated primary or direct selling costs requires a detailed explanation. The direct cost budgets show estimates of the selling costs which will be necessary so that the individual sales departments and territories may perform efficiently the functions laid out for them in the general sales program. Therefore every selling cost item in the budgets is assignable either to a sales department or to a territory or to both. Some items may be allocated directly, but others must be distributed upon bases which measure the amount of service rendered by various expenditures to each sales department and territory.

MANUFACTURING BUDGETS

Forecasting the demand for products is a problem to be solved by the sales, statistical, and executive departments. The manufacturing division has the problem of translating sales estimates into production planning in the most economical and efficient manner. Manufacturing budgets aid management in keeping production at an even level and in controlling the use of material, labor, and equipment.

There are two important factors concerned in budgeting for the manufacturing division: the development of a production schedule in terms of units of each class of commodities to be produced and an estimate of the costs that will be incurred in the completion of this program. The first factor refers to the production budget; the latter refers to such manufacturing budgets as materials, labor, factory overhead, and plant and equipment.

Production Budgets. Production budgets deal with the determination of the total estimated volume of production; with the division of the estimated output into classes or types of products; with the scheduling of operations by days, weeks, and months; with the establishment of finished goods inventory requirements; and, finally, with the storage of finished products until delivery can be made in accordance with sales orders. In the majority of cases production budgets are based upon sales budgets which have been prepared to show the estimated sales in terms of units for each class of product. A few companies find it impracticable to forecast sales because of frequent style changes in the product or because they manufacture largely according to special order. In such cases the production budget is based upon past experience and orders already on hand for future delivery. The production budgets of these concerns cover a relatively short period of time.

The development of production budgets and the procedure followed in planning production are largely dependent upon the type of manufacturing activities which exist in an individual plant. It is necessary to differentiate job order plants from mass-production plants, although many concerns operate as a combination of these two types of manufacturing conditions. Job order production is ordinarily carried on according to customers' orders or specifications, and the customers' requirements as to quantity and time of delivery must be met. The mass-production plant manufactures a number of standardized products made according to predetermined specifications; hence the management may determine in advance the most economical quantities, the most advantageous time to produce, and the engineering specifications.

Budgeting in the job order plant offers many practical difficulties. It is impossible for the sales department to forecast definitely the type of products which will be demanded by purchasers. This inability to estimate customer requirements forces the management to confine the production budget to general production plans in the form of estimated direct labor-hours, machine-hours, or estimated units of each general type of product, although in some cases an analysis of past sales can be made in order to ascertain the elements and operations which are common to all contracts. The products may be grouped in classes or the parts and processes used on items of each class may be ascertained. If orders and contracts are received some time in advance, more detailed production schedules can be prepared. The length of the budget period is necessarily shorter in job order plants than in concerns where mass-production activities exist.

Production schedules can be prepared in more detail and with more success in mass-production plants where standard items are manufactured for stock. Sales estimates can be made for each class of products, and the production budgets, listing detailed production requirements, can be prepared some months in advance.

Materials Budgets. Materials budgets should be based upon the production budget, since the amount of direct material used in manufacturing varies directly with the number of units of output. The problems in connection with materials budgets include the preparation of estimates of raw material requirements necessary to produce the goods as shown in the production budget, scheduling purchases in required quantities at the time needed, and the controlling of raw material inventories.

In most cases the production budget shows the total production of each class of products by weeks or months. The materials budget, which comprises a list of both the direct and indirect material requirements for the budget period, is prepared through the cooperation of the purchasing, planning, and production departments. In companies whose products are of standard design and specification, the preparation of schedules of direct material requirements is relatively easy. Products may be analyzed to such a degree that the exact material requirements for each class are definitely established and the preparation of the materials budgets consists of multiplying the number of units of each class, as shown in the production budget, by the standard or estimated material requirements for that class, due allowances being made for material spoilage and minimum stock requirements.

In many companies raw material requirements cannot be standardized because manufacturing to special order causes the specifications of the products to change appreciably from day to day. In such cases it may be possible to set up ratios between the volume of estimated production and raw material requirements.

Another important consideration is the setting of maximum and minimum *inventories.* The *minimum inventory requirements depend upon* the amount of time needed to replenish the stock of each class of materials and upon the amount of materials which will be consumed each month, week, or day. There are always such contingent factors as rush orders, unanticipated increases in demand, delays in transportation, and defective parts which must be considered in determining minimum inventory requirements, but past experience and the daily and weekly requirements of the production budget can be used as indices to determine the reserve stocks which must be maintained. The majority of well-managed concerns use perpetual inventory stock records through which the balances of materials of each type may be ascertained daily.

The purchasing department generally is responsible for the purchasing budget. Many factors such as the amount of working capital available for inventory investment, available stockroom or warehouse space, cost of handling stocks, insurance on inventories, inventory obsolescence and shrinkage, and the probability of market price changes should be considered in connection with the purchasing budget. The actual budget forms vary according to the type of business, but ordinarily the budget will show production requirements in the form of the estimated quantities and the estimated prices of each class of material for each week and month. Indirect materials (supplies) may be included in the purchasing budget in a separate section or a special purchasing schedule may be prepared. In the majority of concerns the indirect material schedules are included as a part of factory overhead.

Labor Budgets. The labor budget is largely dependent upon the production budget, but consideration must be given to such factors as the rate of turnover of the various classes of labor, wage-payment plans in force, and cost accounting methods in use. If the rate of turnover is large and some training and skill are necessary to prepare new workmen for a specific kind of work, due allowance must be made in terms of hours and of labor cost. In plants producing standard products, the task of estimating direct labor costs consists of analyzing labor-hours and labor cost expended upon each type of product and of multiplying these estimates by the production as shown in the production budget.

The task is more difficult in job order plants. In many concerns straight time is still the predominant method of compensation. There is no standard or incentive involved in the system, and it is impossible to predict accurately the productive capacity of any one worker, as his output may vary from day to day. Forms of piece-rates also make the work of preparing the labor budget a difficult one. The worker may receive a combination of a day and piece-rate, or he may be paid a flat rate per unit of output with a bonus if his work passes a certain quota. Such forms of wage plans make the task of estimating labor difficult because of the many contingent features which they introduce. Where no definite standards can be used, the preparation of labor estimates is made by the factory manager and the foremen or job foremen in charge of each division. Each foreman should be given a schedule of the output expected of his division so that he can estimate the number of workers of each class which will be needed and the time required to perform the operations. His knowledge of prevailing conditions within his division and of past operating experience can be used as a basis. The classification of workers and of direct labor-hours required for each department is translated into direct labor costs and is modified to conform with estimated salary and wage changes by the payroll department. The labor budget can be prepared in terms of departments, processes, or operations under the supervision of the planning or production department to show the estimated weekly and monthly number of direct labor-hours and of direct labor cost for each product.

The labor budget should prove invaluable to the comptroller or treasurer in the determination of cash requirements to meet payroll demands; it should provide the personnel department with a working schedule so that an adequate supply of labor may be obtained at the required time; and it should supply the cost department with a means of controlling inefficiencies in labor and in preparing estimated or standard costs.

Indirect labor is usually considered as an overhead cost, but in a few concerns the estimates for this type of labor are included in the labor budget.

Factory Overhead Budgets. Most companies divide their overhead costs into two classes, fixed and variable. The former includes such costs as depreciation, taxes, and insurance which do not vary with the productive activity of the plant, and the latter comprises controllable items such as supplies and indirect labor which vary to some degree with the volume of production.

The basic type of overhead budget is one which is prepared for the concern as a whole and which shows the estimated amount of each cost for the budget period. This master budget or overhead summary sheet should be supplemented by a detailed budget for each item of overhead and by a budget of the estimated costs for each service and production department. The preparation of budgets for the fixed overhead costs is a relatively simple matter as the amount can be forecasted with almost perfect accuracy. When closely examined, however, the number of costs which remain constant regardless of the volume of production are relatively few. Property taxes, fire insurance, rent, salaries of production managers and foremen, and depreciation of buildings can safely be included in this classification.

Budgets of the fixed costs are not dependent upon sales or production budgets. The cost of each type which have been incurred in the past and knowledge of any changes which may occur during the ensuing budget period are the two determining factors in setting the estimates. Rental contracts generally are made at least a year in advance and any changes in the amount for the next period are likely to be known when the budget is prepared. Tax rates, insurance rates, and property valuation for the next period either are known or can be estimated with a high degree of accuracy. Usually a separate budget sheet is used for each item of cost, the total being subdivided by departments or divisions. Estimated rent is assignable to various service and production departments on the square foot basis; property taxes and fire insurance may be distributed on the basis of the value of equipment in each department; foremen's salaries may be assigned directly to the department in which they are employed; and the salaries of general superintendents and production managers may be prorated on such bases as total labor hours or direct labor hours. In its final form, each budget for a fixed overhead item should show the total estimated cost for that item and the share of the total assigned to each service and production department.

The variable or controllable costs are more difficult to estimate. Such budgets as indirect materials (supplies), indirect labor, repairs, and maintenance are prepared through the cooperation of the foremen or department heads and the factory executives. The scheduled production and operating conditions for the next period must be considered because these costs vary with productive activity. Such budgets as power, heat, light, and water are generally prepared by the cost accountant with the help of the engineering staff and the major factory executives. The records of past experience must be supplemented by consideration of present costs and the effect of the budgeted production upon these cost items during the next period. All budgets should show the total amount of each class of cost, classified by both service and production departments.

ADMINISTRATIVE AND FINANCIAL BUDGETS

Administrative Cost Budgets. The functions performed by the management group of the modern concern are extremely important and varied in scope. In addition to the executive office, there are usually departments such as legal, public relations, general accounting, credit and collections, statistical, research, labor relations, and budgeting. Each department requires allowances for salaries, supplies, depreciation, insurance, utilities, travel, telephone, telegraph, and other operating costs.

The preparation of administrative budgets requires the same careful analysis of the needs of each department that are employed in budgeting for other divisions of the enterprise. Extravagances and disregard for economy by the members of the management group provide no incentive to employees in other divisions to control their costs and meet strict standards of budget performance.

The first step in the preparation of administrative budgets is the analysis of costs for prior years in order to determine the minimum requirements for the efficient operation for each department. A detailed study of each office routine and procedure and a review of daily, weekly, and monthly reports which have become the responsibility of each group may result in the elimination of unnecessary work and the simplification of many tasks. The plans and responsibilities of each administrative department for the budget period must be studied, and changes in planned operations must be projected into dollar estimates for each item of cost in order to provide a workable budget. A master or summary budget, comprising totals of the budgets of the separate departments, should be prepared for the administrative division.

Plant and Equipment Budget. The budget of plant and equipment which deals with plans for expansion is directly dependent upon the production and manufacturing cost budgets. Its creation is an administrative function and should be closely tied in with the general operating policies of the business. Expenditures for plant and equipment necessitate additional capital which carries the administration directly into the problems of financing, the stability of the anticipated demand, the danger of overexpansion, and the expected return on the additional investment.

Plant and equipment budgets are generally based on long-term forecasts. Public utilities such as telephone companies and light and power concerns are noteworthy examples of organizations basing their expansion plans on long-term budgeting. Population growth, building statistics, growth of factories, per capita wealth, and many other important factors are carefully charted as a basis for the preparation of their plant and equipment budgets.

One or more budgets of plant and equipment may be prepared. The usual procedure is to show the amounts estimated for new equipment, replacements, or alterations by months and years for each department or division of the plant.

The Cash Budget. It is the goal of the comptroller, treasurer, or other officers in charge of a concern's finances to maintain an adequate amount of working capital in the form of cash to meet the daily cash expenditures. An insufficient amount of cash on hand may result in loss of purchase discounts, inability to meet payrolls, and embarrassing delay in paying creditors; amounts of cash in excess of needs result in loss in income from investments and unnecessary interest payments. The cash budget is a forecast of expected receipts and disbursements and the estimates of the daily, weekly, and monthly cash requirements to meet anticipated obligations.

The cash budget should include two distinct parts, one including a detailed estimate of cash receipts and the other presenting a detailed estimate of cash disbursements. The estimates are customarily prepared by weeks and months, depending upon the payroll period and credit terms of a particular company. However, one treasurer of a large paper-manufacturing enterprise reported that he prepares estimates of cash requirements for each day of the budget period of a year, revising his preliminary estimates at the beginning of each month. The forecasts of cash receipts include estimates of cash sales, collections of accounts receivable, income from investments, advances from customers, and miscellaneous items such as sale of scrap, sale of equipment and real estate, and tax refunds. The estimates of cash disbursements include requirements for payrolls, cash purchases, accounts payable, liquidation of bank loans, and special obligations such as bonuses, donations, advances to suppliers, interest and principal on bonds, and dividend payments. The comparison of the estimates of receipts and disbursements for each period and the establishment of minimum cash balances provide the estimates of the amount of cash that must be obtained from borrowing, additional capital contributions, the sale of capital assets, or other sources.

The estimates contained in the cash budget are projections of the cash requirements, assuming that the estimates of sales, production, and costs included in all other budgets are correctly prepared. If sales, production, and cost budgets have to be revised to meet changing conditions, the cash budgets must be reviewed and redrafted.

Estimated Financial Statements. If a concern has a complete plan of budgetary control, a master budget will be prepared which summarizes all sales, production, and cost budgets. The master budget contains the data necessary for the preparation of the estimated profit and loss statements, balance sheets, and forecasts of capital expenditures for real estate and equipment. The profit and loss or income statements should be prepared in such detail that management has available before the beginning of the fiscal period estimates of each item of income and expense for each month of the budget period. Estimated balance sheets can also be prepared to disclose the expected financial position of the firm at the end of each month of the budget period.

The study by management of the projected financial statements permits changes in sales and production plans and the revision of one or more budgets before the period of operations begins, in order to prepare for what may appear to be unsatisfactory conditions.

MANAGERIAL USE OF BUDGETS FOR CONTROL

The preparation of budgets for each classification of income and cost for each division of a business enterprise is the initial part of a plan of budgetary procedure, but in order that the programs may serve management as an important control device, there must be established a systematic plan of recording and reporting actual data by the accounting department, daily, weekly, or monthly review and comparison of actual and budgeted figures for each division by the budget committee, followed by regular conferences with supervisors and department heads in order to analyze variances and to inaugurate steps to correct unsatisfactory operations or to revise the budgets. When business conditions are unpredictable and subject to change, many concerns resort to a plan of action characterized as "flexible budgeting."

The Role of the Accounting Department. If budget plans have been properly formulated, the same classification of accounts and subsidiary records are provided for in both budget item descriptions and the accounting records. It becomes the duty of the accountants in the organization to record and classify each transaction according to the established classifications of accounts and to report the actual data and variances from budget estimates to each department head and the budget committee as promptly as possible after the close of the period. In concerns where punch-card accounting is used for budgetary and accounting purposes, the tabulations are frequently available to management within two or three days after the end of the designated accounting period.

Importance of Department Heads in Making Budgets Function. The budgets for each department, as finally approved by the budget committee, are the blueprints for departmental operations during the budget period. Adherence to the budget plans becomes the responsibility of each supervisor, and unless unforeseen circumstances arise which are beyond his control, he is expected to conduct his departmental activities in conformance with the budget. The control aspects of the budgetary program are largely dependent upon the departmental officers, because they are at the scene of the detailed operations and can see the impact of the company's policies and plans on individual workmen and use of equipment. If the departmental officers are not assuming their responsibilities, it is doubtful if control through the use of budgets can be a success.

The departmental officials should be made to feel that they have the confidence and respect of the budget committee, and if it becomes apparent to those executing the budget plans in a particular department that the budget estimates are incorrect or that conditions have changed since the budget was prepared, it should be expected that they will make an immediate appeal to the budget committee for relief from the budget limitations.

The Budget Committee As a Control Group. The budget committee is in a better position than any other managerial group to maintain a constant control over the activities of the sales and production divisions as contrasted with the planned budgeted performance and to investigate variances as they arise. Regular sessions of the budget committee should be scheduled each day or week, but members of the committee should be available for special meetings whenever emergencies arise. Daily and weekly reports of operations and costs should be available to the budget committee so that a check can be made to determine variances from planned performance. Department heads and technical advisers should be invited to the committee meetings to discuss the problems of a particular department or division.

The budget committee should encourage suggestions from all officials and supervisors and should be alert to all changes in conditions within the concern, in the industry, and in the national economy that affect the

EXHIBIT 49

FLEXIBLE BUDGET, COLUMNAR TYPE—DEPARTMENT 10

Based on 1 Month's Operations

		Allowed expense for each level of operating activity										
	Operating Level— Based on direct labor	$50,000	$55,000	$60,000	$65,000	$70,000	$75,000	$80,000	$85,000	$90,000	$ 95,000	$100,000
	Per cent of capacity	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
Acct. No.	Name of Account											
01	Indirect labor	$ 100	$ 110	$ 120	$ 130	$ 140	$ 150	$ 160	$ 170	$ 180	$ 190	$ 200
02	Clerical	1,000	1,000	1,000	3,250	3,250	3,250	4,000	4,000	4,000	4,750	4,750
07	Group leaders	6,000	6,000	6,000	7,800	7,800	7,800	9,600	9,600	9,600	12,000	12,000
09	Reset.—Check.—Correct.	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—
10	Set-up	1,500	1,650	1,800	1,950	2,100	2,250	2,400	2,550	2,700	2,850	3,000
13	Methods	500	500	500	500	500	850	850	850	850	850	850
14	Lost time	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—
19	Rework operations	250	275	300	325	350	375	400	640	675	950	1,000
26	Teaching and learning	500	550	600	650	700	750	800	1,700	1,800	1,900	2,000
28	Supervision	1,250	1,250	1,250	1,600	1,600	1,600	2,000	2,000	2,000	2,000	2,000
29	Inspection	5,000	5,500	6,000	6,500	7,000	7,500	8,000	8,500	9,000	9,500	10,000
35	Vacation allowance	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,700	1,800	1,900	2,000
36	Overtime premium	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	1,000	1,600	1,800
37	Night premium	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	—0—	300	350
89	Payroll taxes—Fed. and state	2,013	2,188	2,363	2,670	2,845	3,030	3,294	3,500	3,708	4,013	4,200
ST	Total Indirect	$19,113	$20,123	$21,133	$26,675	$27,685	$29,055	$33,104	$35,210	$37,313	$ 42,803	$ 44,150
51	Gas and water											
52	Perishable tools											
53	Productive mat'ls.—Not on stds.											
54	Mat'ls. and supplies											
66	Lubricants and cutting compounds											
ST	Total Supplies	$ 5,000	$ 5,500	$ 6,000	$ 6,500	$ 7,000	$ 7,500	$ 8,000	$ 8,500	$ 9,000	$ 14,250	$ 15,000
61	Mach. and equip.—Rep. and maint.											
63	Tool and die maintenance											
64	Plant rearrangement											
68	D. P. C. tool replacement											
ST	Total Maintenance	$ 7,000	$ 7,600	$ 8,200	$ 8,800	$ 9,400	$10,000	$10,600	$11,200	$11,800	$ 13,300	$ 15,000
78	Rental—Mach. and equip.											
81	Build. serv. occupancy											
98	Depreciation—Mach. and equip.											
ST	Total Fixed Charges	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$ 30,000
84	Mfg. errors—Scrap											
ST	Total	$ 2,000	$ 2,200	$ 2,400	$ 2,600	$ 2,800	$ 3,000	$ 3,200	$ 3,400	$ 3,600	$ 3,800	$ 4,000
90	General											
94	Compensation insurance											
ST	Total General	$ 2,013	$ 2,188	$ 2,363	$ 2,670	$ 2,845	$ 3,030	$ 3,294	$ 3,500	$ 3,678	$ 3,956	$ 4,134
GT	Total Indirect Expense	$65,126	$67,611	$70,096	$77,245	$79,730	$82,585	$88,198	$91,810	$95,391	$108,109	$112,284

plans and progress of the company. If budget performance is impossible or impractical under the circumstances, a revision of some or all of the company's budgets may be required.

Flexible Budgeting. The subject of flexible or variable budgeting has been popular in books and periodicals during the past 5 years. Uncertainty in customer demand, shortages of materials, labor disputes, and priorities arising from government contracts have made business forecasting and the preparation of accurate budgets a difficult matter. As a result, budgeting in many concerns is performed with some degree of flexibility, varying from the plan of revising budget estimates from month to month to meet changing conditions to the highly developed program of budget preparation which provides a series of budget estimates for different levels of sales and production which might be expected under varying circumstances during the budget period.

A large bottler of soft drinks, whose sales and production are difficult to forecast because of weather changes, conventions, and military demands, has adopted the following plan of budget preparation. With the best available information as to the potential demand for the company's products as a guide, general estimates of sales, production, and costs are prepared for the budget period of 1 year, but the budgets are not prepared in detail and are not given to department heads as control media. With the general estimates as a guide, budgets are prepared in detail for a 3-month period at the beginning of each quarter. Then at the beginning of each month, the budget estimates for that month are carefully reviewed and a revision is made of any estimates that appear to be unrelated to the expected sales and production activity for the month. In this company the budget committee is constantly reviewing and revising its cost estimates and production plans.

It has become a common practice in many concerns where sales and production cannot be forecast accurately to abandon the concept of fixed budgets which cannot be adjusted automatically with volume changes and to substitute a program of flexible budgets with an amount allowed for each item of cost for progressive rates of activity or levels of production. In preparing these budgets consideration must be given to the fixed and variable elements of cost and the changes that may be expected for each item at various levels of operation. A portion of the flexible budget prepared for a production department of a large steel company, presented as Exhibit 49, shows the amount of expense allowed at progressive rates of activity in steps of 5 per cent from 50 per cent to 100 per cent of normal capacity.[1]

The use of flexible budgeting in accumulating sales and cost data for the purpose of aiding management in formulating plans and making sound business decisions is explained and illustrated in Chaps. XXII and XXIII, dealing with differential cost and break-even analysis.

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[1] HOCKSTAD, E. J., "Dynamic Budgeting for Cost Control," *National Association of Cost Accountants Bulletin*, Oct. 1, 1948, p. 118.

Part II

ACCOUNTING FOR PRODUCTION COSTS

CHAPTER IX

JOB ORDER COSTS: GENERAL PRINCIPLES; MATERIAL, LABOR, AND OVERHEAD

Types of Manufacturing Concerns. There are such varied types of manufacturing concerns that minute classification is impossible, but, for purposes of cost accounting, two general classes can be distinguished: the mass-production industry which provides standard products, and the special-order type of industry with an output of special or custom-made products.

The mass-production concerns are exemplified by such enterprises as chemical plants, flour mills, foundries, canning factories, lumber mills, paper manufacturing, paint factories, tire and rubber companies, processors of foodstuffs, mining, oil producing, and textile manufacturing. This classification includes the vast majority of manufacturing establishments in the United States. The mass-production concern is characterized by quantity production of uniform standard products. The production process generally is continuous, the finished product being the result of successive operations. The products are of uniform variety, are interchangeable in size and form, and are manufactured in accordance with standard specifications. Even though there is a variety of types of products and styles with frequent changes in specifications, records can be maintained to exhibit the total number of units of each kind manufactured in each process. Economies resulting from large-scale production and minute division of labor tend to encourage the growth of mass-production plants and the standardization of consumer demand.

The special-order type of industry is typified by such enterprises as printing shops, construction companies, machine-tool manufacturing, repair shops, structural-steel companies, woodworking shops, and specialty shops producing custom-made hats, clothing, shoes, and musical instruments. The special-order industry is characterized by the manufacture of products in clearly distinguishable lots in accordance with special orders and individual specifications. In mass-production plants, goods are manufactured for stock for an anticipated demand; in special-order enterprises production is planned to supply customers with a specified number of units of a certain type at an agreed sales price or upon a cost-plus basis. Generally each sales order contains specifications to meet the requirements of a customer.

Types of Cost Accounting Systems. Two general types of cost accounting systems have been devised to accumulate cost information for the management of manufacturing concerns, *viz.*, process costs and job order costs.

Process cost accounting is used effectively in mass-production plants. The general plan of operation is relatively simple. In order to accumulate costs, each process or operation in the plant is designated as a separate cost center. During each fiscal period, materials are requisitioned from stockrooms and are charged to particular process accounts; payrolls are used as the basis for charges of labor costs to process accounts; and overhead costs are distributed, either directly or through the use of allocation bases, to process accounts. The total cost of each process, which consists of direct materials, direct labor, and overhead, is divided by the number of units completed in a particular process in order to obtain the average unit cost for the process during the period. In order to obtain the total cost of a product, it is necessary to add together the costs of all processes through which a product has passed.

The operation cost system, which frequently is described incorrectly as another type of cost system, is in reality a refinement of or an adjunct to process cost accounting. The accounting procedure is identical with the one followed in process accounting, except the costing division is an operation rather than the larger sphere of activity designated as a process. The operation cost system entails more detailed accounting, but it supplies management with a more minute analysis of costs and provides a better foundation for the establishment of standard costs.

The job order cost system can be used when products are manufactured in clearly distinguishable lots and when it is practical to keep a separate record of each lot from the time production is begun until it is completed. A production order or cost sheet is created for each special order of products that is to be processed in the plant. The production order is used to record direct material, direct labor, and an estimated amount of overhead costs at each stage of production, and it exhibits the total cost of the order when goods are completed and transferred to finished stock or sent to the shipping department.

A type of cost accounting in manufacturing enterprises which is described frequently as a distinct system of costing is known as the "class cost system." It is not a separate type of cost system, but it combines fundamental principles of both job order and process cost accounting. A major criticism of job order cost accounting is the mass of detailed work involved and the large number of production orders or cost sheets which must be handled. The class cost system retains the general principles of the job order plan which involve the use of production orders to cost material, labor, and overhead separately for each batch of production, but it limits the number of production orders in order to curtail the amount of detailed costing. It is assumed that production can be divided into classes of like products and that the costing of each class of products rather than of each special order will give sufficiently accurate data. In planning production, special orders requiring processing of similar products are grouped together and a single production order is prepared to show costs for the combined production. The total cost, summarized in the production order, is then divided by the number of units completed to obtain the average cost per unit. Thus the total cost for a large number of similar batches of products is obtained and an average cost per unit is derived.

This type of cost system has a limited use since there are not many special-order industries in which various classes of products are sufficiently similar in their processing techniques to warrant combining several of them for costing purposes. The method is much less expensive than is the job order plan, because one production order can be used instead of a dozen or more. It has been used successfully in foundries and in the paper industry.

Two Types of Cost Systems in a Single Business Enterprise. Frequently both the process type of cost system and a form of the job order cost system are operated in the same business enterprise. Business establishments comprising foundry operations and one or more machine departments may find it advantageous to accumulate costs for separate operations and to obtain average costs per unit in the foundry, while in the machine shop—where special orders are processed—material, labor, and overhead costs may be recorded in a separate production order for each job.

The use of two types of systems is exemplified by a paper manufacturing company composed of two separate divisions, *viz.*, the paper mill converting wood pulp and other raw material into corrugated paper stock, and the box factory where boxes of varying sizes and types are manufactured in accordance with special orders. In the paper mill, costs are accumulated for each operation, and an average cost per unit for each operation is obtained. In the box factory each order received by the sales department is the basis for plans for the production of a specified number of boxes according to specifications provided by the buyer. A production order is prepared for each job, and direct material, direct labor, and an estimated share of total overhead costs are accumulated for the order. Therefore the total cost of the finished product is a combination of average costs of raw materials obtained from the paper mill and job costs accumulated for each order in the box factory.

Purposes of Job Order Cost Accounting. Job order cost accounting frequently is called "job cost," "production order," and "specific order" cost accounting. The heart of the system is the production order or cost sheet which is used as a daily record of direct material, direct labor, and estimated factory overhead cost for each department or operation for the entire course of production. Control of detailed costs on production orders is maintained as goods proceed through the plant by means of controlling accounts in the general ledger, which summarize costs of products put into process, transferred to finished goods, and finally sold.

Through the media of production orders, management is informed, immediately after the completion of each job in each department, of the estimated share of the general factory overhead cost which the job should bear in addition to the direct material and labor costs actually incurred. When the total cost of each job is computed, if there are a number of units comprising the job, the average cost per unit can be obtained by dividing the total cost of the production order by the number of units completed. Management is in a position to set selling prices of special orders and to determine the estimated profit or loss on each order before goods are sold. The file of completed production orders constitutes an excellent record of past costs which enables management to determine costs and to quote prices for orders of a similar nature which are in prospect. Likewise the trend of material, labor, and overhead costs can be ascertained by a comparison of production orders completed daily with production orders on file representing earlier production.

Production Orders. Production orders differ as to type and purpose; classification may be indicated as follows:

a. Orders for custom-made or special-order production for customers.
b. Orders for products and parts manufactured for stock.
c. Orders for parts or machines for plant use.
d. Orders for repairs to products for customers or repairs to plant machinery.
e. Orders for reconditioning of defective work.

Production orders differ in form and amount of detailed information. In some concerns it may be advantageous to list in each order the quantity and cost of each type of material and the amount and cost of each class of labor required in the completion of work, while in other factories a summary of material and labor requirements for each order may be sufficient. Some establishments may not be departmentalized, with the result that material, labor, and estimated factory overhead costs may be recorded in production orders for the factory as a whole without regard to specific production departments or operations. Other factories may be departmentalized or minutely divided into operation centers, with the result that production orders are designed so as to exhibit the tabulation of material, labor, and estimated factory overhead for each production department or operation.

Production orders may be prepared to accomplish various purposes. The production order may be primarily a cost sheet containing an order number, a brief description of the work to be done, the number of units to be processed, whether for special order or stock, and material, labor, and factory overhead costs charged to the order. Or a more elaborate form of production order may be planned so as to supply, in addition to cost information, complete instructions, specifications, and factory production plans to supervisors and workmen. In many factories and construction projects, elaborate designs, blueprints, and specifications are necessary for each job, and production orders are limited in their use to the accumulation of detailed cost information.

Exhibit 50 is an example of an order which could be used in an enterprise in which production activities are not departmentalized, or in a

EXHIBIT 50

PRODUCTION-ORDER FORM FOR PLANTS NOT DEPARTMENTALIZED

PRODUCTION ORDER (COST SHEET)

DESCRIPTION

____

______________________________ Order No.______________________

______________________________ Buyer's purchase order No.______________

Date ordered__________________ Date finished____________________

MATERIAL

Date	Quantity	Description	Unit cost	Total cost

LABOR

Date	Employee	Hours worked	Rate	Ext.	

SUMMARY

	Material				
	Labor				
	Applied overhead				
	Total				
	Average cost per unit				

single department, such as the repair department, of a factory which employs process cost accounting elsewhere in the plant.

Production orders representing goods in production processes are controlled in the general ledger by a Work in Process account or, in lieu of a single account, by three accounts termed Materials in Process, Labor in Process, and Factory Overhead in Process. The Materials in Process account summarizes as debits the total amount of direct material charged to production orders; the Labor in Process account is debited for the total amount of direct labor cost added to production orders; and the Factory Overhead in Process account is debited for the total amount of estimated factory overhead applied to production orders during the period.

Accumulation of Costs in a Decentralized Cost Accounting Organization. Before outlining the general procedure for the accumulation of costs in production orders and the control of such costs in the general ledger, it is necessary to describe two general types of organizations of cost accounting activity, *viz.*, the decentralized and the centralized methods of recording costs.

When the decentralized plan of recording cost information is in use, a production order actually accompanies jobs as they are transferred from one department to another. The production order is attached to plans and specifications which are sent to the supervisor of the department or operation initiating the production process. The supervisor, foreman, timekeeper, or cost clerk in the department is responsible for recording cost information in the production order. Materials requisitions are used as the basis for charging material costs to the order; time tickets and piece-rate reports are records from which labor hours and labor costs are obtained; and a predetermined rate per hour of direct labor, machine-hour, or dollar of direct labor cost is given to the department as the basis for the application of factory overhead to each order. In production departments handling many production orders daily, it is necessary to employ a cost clerk to accumulate and to record cost information; in departments or factories with a small volume of orders and relatively few items of cost, a timekeeper or foreman may tabulate cost information in production orders in addition to other duties. When products represented by a production order have been completed, the units and the production order are transferred to the next department where processing is resumed and where cost information is recorded in the production order by the cost clerk or department representative of that department.

The decentralized plan has the advantage of having cost entries made in production orders in departments where the actual work is done and where the attention of department and plant executives can be focused on material and labor costs as they are incurred. There is the disadvantage of having departmental employees, who may not be properly trained or interested in cost accounting, responsible for accumulating cost information and tabulating it in production orders.

Accumulation of Costs in a Centralized Cost Accounting Organization. When the centralized plan of accumulating cost information is in use, production orders do not accompany production through the plant. Each production order is given a number which corresponds to the number assigned to a batch of production which is to be processed. The production order for each job is retained in the cost accounting department for the purpose of accumulating cost information for the particular order as the job is processed in the factory. Copies of material requisitions and of time tickets or wage reports, bearing production-order numbers and representing work done for each day or week, are sent to the cost department to be used as the basis for charges for direct material and direct labor to production orders. A schedule of factory overhead application rates, with one rate for each production department, is prepared by the cost department as the basis for charges to production orders for factory overhead costs.

The plan of a centralized cost accounting organization is advantageous in that all cost information recorded in copies of material requisitions, time and labor reports, and factory overhead application schedules for each department are on file in the cost department where tabulation is made in production orders by clerks who specialize in cost work. In addition production orders representing all production in process and completed are located in the cost department.

ACCOUNTING FOR MATERIAL COSTS

Job order cost accounting requires that direct materials and their cost be distinguishable by jobs at each stage of the production process, from the time materials are requisitioned from stockrooms until products are completed and transferred to finished stock. Indirect materials and supplies must be accounted for from the time they are issued from stockrooms until properly charged to production and service departments' standing orders.

In order to effect a complete system of material control and accounting, it is necessary to devise a number of subsidiary records which will contain detailed material costs and to maintain controlling accounts in the general ledger which will summarize periodically material costs as materials are consumed directly or indirectly in performing production and service functions within the factory. The subsidiary records include one or more stock ledgers, material requisitions, production orders, standing orders for indirect materials, returned-material reports, scrap reports, and inventory reports. The general ledger controlling accounts involved are Materials Control, Materials in Process, Factory Overhead Control, and Finished Goods.

Purchases of Materials. Generally the purchase of materials and supplies for stock is the most important type of purchase made. Vouchers covering materials purchased for stock are entered in the voucher register as:

Materials Control.................................xxx
  Vouchers Payable..xxx

In the stock ledger, subsidiary to the Materials Control account, an entry is made in the received section of the appropriate stock accounts.

Production departments which operate as special-order divisions frequently require special materials and parts which are not stocked regularly. Production would be delayed unduly if materials and parts immediately necessary for work in process were to be acquired and handled only through the regular purchasing, receiving, and stockroom channels. Consequently special orders initiated by the planning department or production departments are marked "emergency" and are given special consideration by the purchasing, receiving, and testing departments. When such emergency materials and supplies are received, they are sent directly to production departments. The entry in the voucher register required to record materials and parts purchased for immediate use in production departments is as follows:

Materials in Process.................................xxx
  Vouchers Payable..xxx

A supporting subsidiary entry for the cost of materials and parts is made in the materials cost section of the production orders in process for which the purchases were made.

Purchase requisitions are prepared by production and service department executives for materials and parts needed to repair machinery and equipment in the event that the items required are not a part of the regular stock. Upon receipt they are sent directly to the department which requested the purchase without being handled or recorded by stockkeepers. The entry in the voucher register for the purchase of repair materials and parts is as follows:

Factory Overhead Control...........................xxx
  Vouchers Payable..xxx

Issue of Direct Materials. Material requisitions are so prepared as to indicate whether materials obtained from stockrooms are direct materials to be consumed in production processes or indirect materials used for general purposes not directly identified with production orders. Foremen and executives of production departments are responsible for determining which materials are direct and which are indirect. One form of requisition may be designated for use in requisitioning direct materials, and a second form, differing in color or serial number, may be employed for indirect materials; or a general requisition may be prepared for all purposes. The general requisition may contain two columns, one for direct materials and another for indirect materials, so that the proper classification can be made at the time the form is prepared.

Two copies of the material requisition are prepared; one copy is returned, after being priced by the pricing clerk, to the department which requires the material, while the other is filed by the stock ledger clerk as evidence of the proper issue of materials. The cost clerk in each department or in the centralized cost department makes daily use of the departmental copy of material requisitions as a basis for recording the material cost of direct materials in the Material section of appropriate production orders. The stock ledger clerk uses his copy of the material requisition as the basis for an entry in the Issued section of the appropriate stock ledger accounts for the cost of the material.

Periodically stock ledger clerks and production department cost clerks prepare, independently, summaries of the cost of direct materials issued from stockrooms and charged to production orders. The accountant in charge of the general ledger receives the independent summary reports which he checks, one against the other, and then prepares the following journal entry:

Materials in Process..............................xxx
  Materials Control..xxx

Issue of Indirect Materials. Supplies and other forms of indirect materials are requisitioned from stockrooms for use in production and service departments in the same manner as are direct materials. The cost of indirect materials is entered daily in the Issued section of individual stock ledger accounts maintained by stock ledger clerks. Requisitions are summarized periodically and are entered in the standing order for indirect materials or supplies as a charge to particular production or service departments if a departmental organization is maintained.

A summary of indirect materials issued from stockrooms may be compared with the total amount charged to the standing order for supplies. A journal entry is made as follows:

Factory Overhead Control...........................xxx
  Materials Control..xxx

Materials Returned to Stockrooms. Frequently materials in excess of the needs of production orders are requisitioned from the stockrooms in order that there will be no delay if materials are spoiled or if greater quantities are required than estimates indicate. Occasionally production orders are changed or canceled, and the return of materials to stock is necessary. In such cases a materials returned report is made out in duplicate to show the production order or standing order to be credited, a description of the material, reason for the return, quantity, unit cost, and total cost.

In the subsidiary records an entry for the original cost of the material returned is made in the Received section in black or in the Issued section in red in the appropriate stock ledger account. The production order in question is credited for the cost of the material returned to the stockroom either by changing the amount of material charged to the order or by means of an entry in a materials returned section provided in some types of production orders. The general ledger accounts are affected by means of a journal entry summarizing a number of transactions as follows:

Materials Control	xxx	
Materials in Process		xxx

Indirect materials returned to stockrooms are entered in the same manner in the stock ledger records, but an adjustment is made in the standing order for indirect materials instead of in production orders. The general ledger entry is as follows:

Materials Control	xxx	
Factory Overhead Control		xxx

Materials in Process. The Materials in Process account is a controlling account in the general ledger which summarizes the cost of materials in process as shown in production orders. It is charged for the total amount of materials which are requisitioned from stockrooms and used directly in production. The materials required for each job are entered in the materials section of the production order for the job. The Materials in Process account is credited for the cost of materials shown in completed production orders and a corresponding general ledger debit is made to Finished Goods. The cost of materials, shown in completed production orders, is transferred to the finished goods subsidiary ledger.

At the end of each accounting period the balance of the Materials in Process account should be equal to the total material costs, representing work in process, charged to production orders that remain uncompleted. It may be advantageous to transfer the balance of the Materials in Process account to a temporary Work in Process Inventory account until the balance sheet of the period has been prepared and then to reverse the entry at the beginning of the next accounting period. An alternative is *to consider the balance of the Materials in Process account as the cost* value of inventory of materials in process.

ACCOUNTING FOR LABOR COSTS

Control of labor costs is obtained in job order cost accounting through the use of controlling accounts for Payroll Control, Labor in Process, Factory Overhead Control, and Finished Goods in the general ledger and by time tickets, payroll sheets, production orders, standing orders, and the finished goods ledger as subsidiary records. It is necessary that direct labor hours and costs be distinguishable by jobs at each stage of production processes from the time labor is employed in the first department until the job is completed and transferred to finished stock. Indirect labor, consisting of supervisors, clerical employees, factory helpers, building service, and major factory executives, must be accounted for in terms of hours or days of work and by the service and production departments in which their activities are centered.

Accounting for Direct Labor. Timekeepers or departmental clerks are responsible for the proper classification of labor as to direct labor, indirect labor, and idle time. A time ticket designed to show the production-order numbers and the hours and minutes required is prepared for each workman who is paid an hourly wage. In case workmen receive compensation on the basis of the quantity of units completed, a piece-rate card is prepared for each workman to show daily the identity of each production order worked on, the number of pieces completed for each order, the rate per piece, and the total labor cost for each order.

Time tickets and piece-rate cards are the basis for daily entries by the cost department in production orders, while weekly or monthly summaries form the basis for entries to general ledger accounts. The entries necessary to record the distribution of the direct labor cost to work in process are as follows:

Entry in general ledger:
Labor in Process....................................xxx
Payroll Control..xxx
Entry in subsidiary records:
Number of hours and labor cost recorded daily in the labor section of production orders from information obtained from daily time tickets and piece-rate cards.

Accounting for Indirect Labor. Indirect laborers such as supervisors, clerks, and executives are paid by the week, day, or hour. Their time is recorded on a time card or sheet prepared either by the employees themselves, through the use of a time clock which records the time of arrival and departure, or by a timekeeper in each department. Factory workers who divide their time between direct and indirect labor have their hours of indirect labor shown on their daily time tickets.

The time tickets and time sheets are summarized weekly, or less frequently, to form the basis for the entry to distribute the portion of the payroll representing indirect labor for the period.

Entry in general ledger:
Factory Overhead Control..... xxx
Payroll Control..xxx
Entry in subsidiary records:
The indirect labor cost is entered as a charge to appropriate service and production departments in the standing order for indirect labor.

Labor in Process. The Labor in Process account is a controlling account carried in the general ledger for the purpose of summarizing the direct labor costs used in production as shown in the labor section of production orders. The account is debited for the total amount of direct labor recorded in production orders from the daily time tickets. The account is credited for the cost of labor shown in production orders which are completed and transferred to finished stock, and the Finished Goods account is debited for the total labor cost.

At the end of each accounting period the balance of the Labor in Process account represents the total labor cost recorded in production orders remaining in process as uncompleted. The Labor in Process account may be closed into a temporary account termed Work in Process Inventory; the latter account is debited and the Labor in Process account is credited. The entry is reversed at the beginning of the new accounting period so that the Labor in Process account will have an opening balance representing the value of labor in process as shown in production orders. Instead of closing the Labor in Process account at the end of the accounting period, an alternative is to use the account as an inventory account, affording a similar treatment to Materials in Process and to Factory Overhead in Process.

ACCOUNTING FOR FACTORY OVERHEAD COSTS

The Problem of Overhead Application. The chief problem in the application of overhead costs to production is to find a method of charging an aliquot amount of the total overhead for each department, or for the factory as a whole, to production orders. It involves the budgeting of overhead for the entire factory and perhaps for each production department; the budgeting of production in terms of units, direct labor hours, machine-hours, or direct labor cost for the factory as a whole and, when departmentalization exists, for each production department; the determination of equitable overhead application rates for the factory as a whole or for each production department; the application of an equitable amount of overhead to each production order by means of predetermined application rates; the comparison of actual overhead costs with the overhead applied to production; and the disposal of variances between actual and applied overhead at the end of each period.

Early Methods of Applying Factory Overhead Costs to Production. In pioneer systems of job order cost accounting, direct materials and labor were considered the most important elements of the total cost of production, while overhead cost was a less important factor. Direct materials and labor costs were recorded daily on production orders as the orders followed jobs through the plant. Products completed were transferred to finished stock and subsequently were sold, but the total cost of each production order could not be obtained until the end of the accounting period, which might be a month, a quarter, or in some cases a year later. The missing portion of the cost of each order was the factory overhead, which was divided among production orders by means of distribution rates computed at the end of each period when the total factory overhead was accumulated.

It was convenient and popular to apply factory overhead to production at the end of each period by means of such bases as direct material cost, direct labor cost, and prime cost. The formulas for each of these methods follow:

Direct Material Cost Method:

$$\frac{\text{Actual factory overhead for fiscal period}}{\text{Actual direct material cost for fiscal period}} = \%\text{ of direct material cost}$$

Direct Labor Cost Method:

$$\frac{\text{Actual factory overhead for fiscal period}}{\text{Actual direct labor cost for fiscal period}} = \%\text{ of direct labor cost}$$

Prime Cost Method:

$$\frac{\text{Actual factory overhead for fiscal period}}{\text{Actual prime cost (direct material + direct labor) for fiscal period}} = \%\text{ of prime cost}$$

Thus, in computing a rate by the direct labor cost method, it may be assumed that, for a given period, the factory overhead was $10,000 and the factory payroll was $20,000; a rate of 50 per cent of direct labor cost would be a basis for distribution of overhead to production for the period. If production order 1001, completed during the period, had a direct material cost of $12 and a direct labor cost of $10, the 50 per cent rate would be applied, and an amount of factory overhead of $5 would be added to the order to obtain a total cost of $27.

Criticisms of Early Methods. It is conveneint to use these early methods of overhead application as a basis of criticism and as a starting point from which improvements in the technique of applying overhead to production have developed. The improvements have evolved gradually, more or less as a result of trial and error without new techniques being identified with any particular period of time, although it is safe to say that most of the progress has been made in the past 25 years.

An analysis of the early methods of overhead application makes possible the following criticisms, each of which has led to the development of a major improvement in applying overhead to production.

a. A major criticism is directed at the historical character of the application of factory overhead. Management is not able to obtain the amount of overhead applicable to each job or to secure the total cost of jobs until the end of an accounting period. Products are finished and sold, and prices are set days, weeks, or months before costs of orders are known. The remedy is the use of predetermined overhead application rates obtained from a system of budgetary control which provides budget estimates of both overhead and production in advance of the accounting period.

b. A corollary to the use of predetermined overhead application rates is the need for computing normal rates which equalize the seasonal character of both overhead and production, typical of the great majority of business enterprises. Thus, instead of devising overhead rates based on estimates of overhead and production for each month, budget estimates are prepared for overhead and production and rates are computed for a normal period of business activity, which is generally a year.

c. The direct material cost, direct labor cost, and prime cost methods are not equitable in the allocation of overhead to production. An examination of each method shows clearly that it has no relation to the incurrence of overhead which accrues primarily on the basis of time. Improvements in the application of overhead to production have been introduced in the form of the direct labor hour and the machine-hour methods.

d. Early job order cost systems did not provide for the application of overhead costs to production through the media of departmental rates. It is impossible to select a single overhead rate for an enterprise which will properly assign an aliquot portion of overhead to each job when there are a variety of machine and labor operations performed by workers of varying skill and wage classifications. The separation of factories into service and production departments and the determination of a separate overhead rate for each production department have been important advances in developing more efficient job order cost accounting systems.

e. The application of overhead to production at the end of an accounting period is a means of spreading the actual overhead equitably to each job; the use of predetermined overhead rates is a means of allocating daily to each job what is estimated to be the amount of overhead which will be accumulated at the end of the accounting period. Neither plan provides a means of indicating what *should be* the amount of overhead; what the production *should be* and; what *should be* the amount of overhead charged to each production order if the factory were operated efficiently according to standards predetermined by management. Standard costs can be superimposed upon a system of job order cost accounting as a means of measuring the operating efficiency of departments and of the plant as a whole.

Thus modern job order cost accounting systems have changed form and are now characterized by the use of normal, predetermined, departmental overhead rates such as direct labor hours and machine-hours, which are based on the time factor. Budgetary control of overhead and of production plays an important role in the efficient application of overhead to production, and standard costs have been introduced as a supplementary device to appraise the efficiency with which departments and the business enterprise in its entirety are being operated.

The first three forms of improvements, *viz.*, predetermined overhead rates, normal overhead rates, and rates based on the time factor, are discussed in the present chapter. Departmentalization of enterprises and departmental overhead rates are discussed in the following chapter, and standard costs as related to job order cost accounting are discussed in Chap. XVII.

Importance of Budgetary Control in Determining Overhead Rates.[1] It is necessary to explain the importance of and the part played by budgetary control in job order cost systems. These systems are only as effective as are the plans of budgetary control which underlie them. If the budgets are inaccurately prepared, disproportional amounts of the overhead cost will be applied to production, and management will be misinformed in regard to factory costs and misguided in evaluating departmental efficiency.

A typical formula for the determination of overhead rates is the one for the direct labor-hour rate, which can be presented as follows:

$$\frac{\left\{\begin{array}{r}\text{Estimate of overhead}\\ \text{for budget period}\end{array}\right\}}{\left\{\begin{array}{r}\text{Estimate of direct labor hours}\\ \text{for budget period}\end{array}\right\}} = \left\{\begin{array}{l}\text{rate per direct}\\ \text{labor hour for}\\ \text{budget period}\end{array}\right\}$$

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[1] Budgeting of factory overhead and production are explained in detail in Chap. VIII.

In order to compute the direct labor hour rate, or other rates such as machine-hours or direct labor cost, it is necessary that a system of budgetary control should produce two budgets: a budget of the overhead costs which are anticipated for the budget period and a budget of production expected for the period measured in terms of direct labor hours or some other common denominator such as machine-hours, direct labor cost, or production units.

Seasonal Character of Manufacturing Activities and Costs. The majority of manufacturing enterprises are subject to monthly seasonal variations during the course of a year in both factory overhead and productive activity. Many factory overhead costs, such as taxes, depreciation, rent, insurance, and salaries of the factory executive staff, tend to be constant and unchanging from month to month. Although the fixed overhead group generally constitutes the largest amount of the total overhead costs, variable costs such as repairs, light, power, heat, supplies, and certain types of indirect labor vary in amount each month or season to such an extent as to warrant consideration being given to their seasonal character. Repairs to buildings, machinery, and equipment frequently are made during periods of slack production so that factory employees can be used in the reconditioning work and a minimum of interference with production schedules can be secured. Heat and light are largest during winter months, even though production during that time is relatively small. The consumption of power and supplies tends to be larger during peak periods of production, although the rate of increase is not in proportion to the increase in productive activity.

Production is even more susceptible to seasonal variation than are factory overhead costs. Many manufacturing establishments, such as those in the clothing industry, must plan style changes in their products months in advance of the spring, summer, fall, and winter demand. Orders are received from the wholesale and retail trade several months before the beginning of each season, which frequently causes manufacturing activities to be geared up to plant capacity for a few weeks each season, followed by a period of low production activity when the factory machinery and equipment are being reconditioned for the requirements of the next season. The automobile and furniture industries are other examples of seasonal production.

The cost accountant can meet the problem by using a normal overhead application rate so that day-to-day costing of production orders will not improperly reflect the monthly increases and decreases in factory overhead and production.

Need for Normal Overhead Application Rates. In business enterprises in which seasonal conditions of overhead and production exist, the cost accounting records should reflect a normal or average overhead charge per unit or per hour of operation during a normal period of operation, usually a year. Costs are used by management for the purpose of comparing the productive efficiency of plants, departments, and operations;

as a basis for determining prices for each order; and for the purpose of formulating price lists to be sent to customers. If costs are to be of value to management, the overhead costs applied to production from day to day must be normal or average costs per unit or per hour of production rather than the actual cost for the particular period. If overhead costs are not applied to production orders by means of a normal overhead rate, jobs that are completed during months of low production or of high overhead costs will have a larger amount of overhead applied to them than will work completed in months of large production or of low overhead costs.

Exhibit 51, a hypothetical case of seasonal conditions in a plant producing only one product, ice cream sold in gallon lots, illustrates the need for *normal* overhead rates rather than monthly application rates.

EXHIBIT 51

ACTUAL AND NORMAL OVERHEAD COST PER GALLON OF ICE CREAM IN A PLANT FOR A YEAR

Month	Factory overhead cost	Production, gal.	Actual factory overhead per gallon	Normal factory overhead per gallon
January	$ 1,000	2,000	$0.50	$0.23
February	1,080	1,800	0.60	0.23
March	840	2,100	0.40	0.23
April	616	2,200	0.28	0.23
May	875	3,500	0.25	0.23
June	1,500	7,500	0.20	0.23
July	1,980	11,000	0.18	0.23
August	1,800	12,000	0.15	0.23
September	1,400	7,000	0.20	0.23
October	1,000	4,000	0.25	0.23
November	1,012	3,500	0.29	0.23
December	1,870	8,500	0.22	0.23
Total for year	$14,973	65,100		$0.23

The average or normal overhead per gallon of ice cream is $0.23, but the actual overhead cost per gallon in February is $0.60 and in August is $0.15. Overhead costs tend to vary with an increase or a decrease in production, but the amount of increase is small in comparison with the increase or decrease in production, since certain costs such as taxes, rent, depreciation, and salaries remain constant. The increase or decrease in overhead is caused by changes in such items as supplies, repairs, light, power, heat, refrigeration, and indirect labor which vary with production and seasons. The fact that overhead costs are abnormally high in January, February, and March may be attributed in part to repairs made during these months when production is small and in part to larger lighting and heating costs.

It is apparent that, if overhead rates are computed separately for each month, unreliable costs will result. Production orders costed in February would contain an applied overhead cost computed by multiplying the number of gallons required for each job by $0.60 a gallon, the separate monthly rate, which will give astonishingly high total costs. The manager may be tempted to discontinue soliciting orders or to raise the price of his product because the cost records show that he is losing money on every gallon of ice cream that he sells. Either policy will prove disastrous, because it will tend to lower production, which in turn will increase the overhead cost per gallon.

Production orders costed in August when production reaches the peak for the year will contain an applied amount of overhead obtained by multiplying the production in terms of gallons for each order by $0.15, the overhead cost per gallon for the month. The manager may be unduly encouraged by the large profit obtained per order and per gallon of ice cream.

In neither case are true costs presented to management. Overhead costs must be considered in terms of the entire production for the budget period, which is usually a year. If a normal rate is used to apply overhead to production, the identical amount of overhead is allocated to a gallon in February as is applied in August, and the management is encouraged to think in terms of normal or average overhead costs per gallon.

Monthly Overhead Variance the Result of Using Normal Rates. When normal overhead rates are used, the accounting records for a single month may show under- or overapplied overhead. The difference between the amount of actual overhead and applied overhead may be termed "variance."

The monthly variances between actual and applied overhead costs, which occur when the normal overhead rate of $0.23 is applied to the figures given in the preceding section, are shown in the table below, Exhibit 52.

In 7 months of the year the amount of overhead applied to production was less than actual overhead for the same period, while in the remaining 5 months of the year production was larger and greater amounts of overhead costs were absorbed with the result that the seasonal variations were entirely offset by the end of the year.

The accounting treatment of overhead variances at the end of each month is discussed in Chap. X.

Determination of Normal Overhead Rates. A system of budgetary control is a prerequisite to the correct determination of normal overhead rates. The majority of business enterprises pass through a complete cycle of business activity in the course of a year. Thus the budgets of factory overhead and production may be built for a year in advance of operations. A separate budget generally is prepared for factory overhead for each month of the year, and the sum of the 12 monthly estimates of overhead is divided by 12 to obtain an average monthly estimate. In a similar manner a budget is prepared for production in terms of units, direct labor or machine-hours, for each month of the year, and the sum of the monthly estimates is divided by 12 to obtain an average monthly production. The predetermined normal or average overhead rate is computed by dividing the average of the monthly overhead estimate by the average monthly production estimate. The predetermined normal rate is used to apply a normal amount of factory overhead to each production order processed in the plant. If the rate is correctly computed, all the factory overhead for the year will be applied by the end of the year, although there may be over- or underapplied amounts from month to month.

EXHIBIT 52

MONTHLY VARIANCES BETWEEN ACTUAL AND APPLIED OVERHEAD COST

Month	Applied overhead cost		Actual factory overhead	Variance	
				Applied less than actual	Applied more than actual
January	2,000 @ $0.23	$ 460	$ 1,000	$ 540	
February	1,800 @ 0.23	414	1,080	666	
March	2,100 @ 0.23	483	840	357	
April	2,200 @ 0.23	506	616	110	
May	3,500 @ 0.23	805	875	70	
June	7,500 @ 0.23	1,725	1,500		$ 225
July	11,000 @ 0.23	2,530	1,980		550
August	12,000 @ 0.23	2,760	1,800		960
September	7,000 @ 0.23	1,610	1,400		210
October	4,000 @ 0.23	920	1,000	80	
November	3,500 @ 0.23	805	1,012	207	
December	8,500 @ 0.23	1,955	1,870		85
Total	65,100 @ $0.23	$14,973	$14,973	$2,030	$2,030

Methods of Applying Factory Overhead Cost. Since it is impossible to identify various items of factory overhead with each job processed, it is necessary to find an equitable base which can be used to distribute a portion of the total overhead for the year to each production order. The search has been for a common denominator, a factor common to all production, which is practical and economical in its application and which apportions overhead to production in accordance with its incurrence.

Among the many methods that have been adopted to apply overhead to production the most common are as follows:

a. Percentage of direct labor cost.
b. Production in terms of units.
c. Direct labor hours.
d. Machine-hours.

Percentage of Direct Labor Cost Method. The formula for the computation of the direct labor cost rate is as follows:

$$\frac{\text{Estimated factory overhead for budget period}}{\text{Estimated direct labor cost for budget period}} = \%\text{ of direct labor cost}$$

If the estimate of factory overhead for the budget period is $3,000 and the estimates of direct labor payroll costs for the period total $10,000, the normal overhead rate is 30 per cent of direct labor cost. If production order 2015 has a direct labor cost of $10, an amount of $3 will be applied as the production order's share of the total factory overhead.

The direct labor cost method is considered an economical method because payroll costs are always available as an aid in preparing budgets, and each production order has assigned to it an amount of direct labor costs which can be used as a basis for applying overhead.

The method is inequitable because it applies a greater amount of overhead to jobs performed by workers receiving high wages. If workman A is paid $0.75 an hour and workman B $1.00 and if, in 2 hr., each completes the same quantity of work but on separate production orders, the application of a 30 per cent overhead rate would result in a charge of $0.45 for overhead on the production order completed by A and a charge of $0.60 on that completed by B. Workmen A and B each used plant facilities, including space, tools, machinery, light, power, and supervision, for the same length of time, and the orders they completed in the same length of time should receive the same amount of applied overhead. The direct labor cost method results in the work of high-paid workmen being charged more overhead than jobs completed by workers receiving low wages, in spite of the fact that all workers are responsible for the incurrence of overhead costs in almost identical proportion. In fact, workmen who are skilled and efficient may be more economical in the use of power, light, supplies, tools, machinery, and supervision than low-paid, untrained workmen.

In plants or production departments where a uniform hour or day wage rate is paid to workmen of equal skill, it is optional whether the direct labor cost method or the direct labor hour method is used because the amount of overhead applied to each order will be the same. If such a condition exists, generally the direct labor cost method of applying overhead is employed because it is easier to apply. However, there are few factories or departments in existence in which labor rates and labor efficiency are uniform.

Production Unit Method. One of the simplest methods of applying factory overhead to production is the number of production units such as pounds, tons, hundred pieces, thousand feet, and gallons. The formula for this method is as follows:

$$\frac{\text{Estimated factory overhead for budget period}}{\text{Estimated production in terms of units for budget period}} = \text{overhead rate per unit}$$

Assume that a concern produces a single product, a machine. If estimated factory overhead costs for the budget period are $4,000 and if the estimated number of machines to be produced during the period is 2,000, the overhead rate per machine is $2. If production order 105 schedules the production of 100 machines, $200 of factory overhead will be applied to the order.

The fact that manufacturing concerns customarily produce many products of varying style and kind forces the cost accountant to use a common denominator such as direct labor hours rather than units of production as the basis of application. Thus the production unit method can be used in only a few industries or in one or more production departments in a large enterprise employing job order cost methods.

Direct Labor Hour Method. The direct labor hour rate is computed by means of the following formula:

$$\frac{\text{Estimated factory overhead for budget period}}{\text{Estimated direct labor hours for budget period}} = \text{rate per hour of direct labor}$$

If the estimated factory overhead costs total $12,000 and the estimated production for the period in terms of direct labor is 24,000 hr., the estimated rate per direct labor hour is $0.50. Production order 109, to which $10 of direct labor representing 10 hr. of labor at $1 per hour has been charged, will receive applied factory overhead amounting to $5.

The direct labor hour method is ideally adapted to plants or production departments where labor is the most important cost element. Since the majority of factory overhead costs accrue on the basis of time, the direct labor hour method is the most equitable means of apportioning factory overhead to production. The number of hours required to complete an order is the paramount factor in determining the amount of overhead that should be charged to the order. An apprentice, paid a wage of $0.75 an hour, generally consumes as much overhead as does a highly skilled workman who is paid $3 an hour.

Direct Labor Hour Method Applicable for Piecework Wages. When piece-rates are in force in a plant or production department, the direct labor hour method of applying factory overhead to production is the most equitable method. If the direct labor cost method is used, a greater amount of overhead is charged to the production of the most efficient workmen who are able to complete a larger number of units in a given time, while the method favors workmen who are slower and complete fewer units per hour. For example, assume that two workmen, A and B, are each assigned to complete a production order, each order covering 100 units of finished product, and that workmen are paid at the rate of $1 per hundred units. Workman A, the speedier of the two, completes his production order in 1 hr., his production record being 100 units an hour. Workman B, an apprentice, is capable of completing only 50 units an hour, the completion of his production order requiring 2 hr. of work. Since piece-rates are in effect, the direct labor cost on each order will be the same, $1, regardless of whether the direct labor cost method or the direct labor hour method of applying overhead to production is used. The amount of overhead applied to each production order will differ as to the type of overhead rate used. If the direct labor cost method is used, the same amount of overhead will be applied to each order regardless of the fact that the work completed by workman B required twice as much time in production as the work of workman A. Such an application of overhead is inequitable, and management is not informed as to the true operating efficiency of the two workmen. In reality the production order completed by workman B should be charged twice as much overhead as the other order because it was in production 2 hr. instead of 1 and workman B used plant facilities and consumed overhead twice as long as A. The direct labor hour method is the preferred one because it considers the time consumed rather than the labor cost involved. When the two production orders are analyzed by management, it should be apparent that fast workers are to be preferred from the point of view of efficient plant operation and overhead apportionment even though piece-rates are in effect.

Machine-hour Method. The machine-hour method is similar to the direct labor hour plan except that factory overhead costs are applied to production orders on the basis of the number of machine-hours required to complete the production rather than of the number of direct labor hours. The formula used to derive the machine-hour rate is as follows:

$$\frac{\text{Estimated factory overhead for budget period}}{\text{Estimated machine-hours for budget period}} = \text{rate per machine-hour}$$

The machine-hour method is based on the principle that, in plants where operations are primarily mechanical and machines constitute a more important and costly element than labor, factory overhead costs are equitably applied to production on the basis of the hours machines are used for each job. Where machines are the most important production media, overhead items such as rent of space occupied, depreciation of machines and plant, repairs to machinery, power, and similar items accrue largely as a result of machine operation, and the time factor, machine-hours, is the most satisfactory overhead application base.

The machine-hour method is used most satisfactorily when plants are departmentalized and a rate for each department, or in some instances for each machine, is required. It is not well adapted where a single overhead rate for the entire plant is desired, because generally manufacturing concerns are composed of many different processes which involve a variety of types of hand, bench, and machine operations, performed by different grades of workers. A discussion of departmentalization and the use of the machine-hour method is undertaken in the following chapter.

Accounting Procedure for Factory Overhead Costs. The accounting treatment for factory overhead costs involves three different groups of entries:

a. Accounting for the applied factory overhead costs during the accounting period when the normal overhead rate is used to cost production orders.

b. Accounting for actual factory overhead costs.

c. Accounting procedure required at the end of the accounting period to obtain a comparison between applied factory overhead costs and actual factory overhead costs and subsequently to dispose of the variance existing between the two overhead cost elements.

In the present chapter the discussion and accounting treatment of overhead as an element of cost are predicated upon the assumption that the manufacturing division of the business enterprise is not departmentalized. The next chapter contains a discussion of the accounting treatment required for enterprises operating as departmentalized organizations which require a separate factory overhead rate for each production department.

Accounting for Applied Factory Overhead. Daily, as production orders are costed for work completed in the factory, the factory overhead rate, which was predetermined for the year through the use of budgets of factory overhead costs and production in terms of direct labor hours or other bases, is used to apply an amount of factory overhead to each production order. Thus, if the normal overhead rate is $0.50 an hour, production order 1064, which contains direct material cost of $15 and direct labor cost of $20 composed of 20 hr. of direct labor at $1 an hour, will receive a charge of $10 as the amount of factory overhead applied to the order. Charges to production orders for material, labor, and applied overhead may be made in the factory where the processing was done or in the cost department from records sent to that department. Since production orders may be transferred from production departments to finished stock when orders are completed, it may be necessary to maintain in the cost department an analysis sheet or register to record and to summarize the amount of factory overhead applied to each production order. A form which can be used to summarize applied factory overhead costs charged to orders is suggested as Exhibit 53.

When each job is completed, the normal factory overhead rate is used to apply an amount of overhead to each production order. The amount of overhead applied to each order is recorded in the applied factory overhead analysis sheet which is summarized weekly or monthly and the total is used as the basis for the journal entry:

Factory Overhead in Process	xxx	
Applied Factory Overhead		xxx

The Factory Overhead in Process account together with Materials in Process and Labor in Process are general ledger controlling accounts which summarize the direct material, direct labor, and applied factory overhead costs charged to production orders.

A summary of the total costs charged to production orders which represent jobs completed is prepared periodically as the basis for the following journal entry:

Finished Goods	xxx	
Materials in Process		xxx
Labor in Process		xxx
Factory Overhead in Process		xxx

Thus during each accounting period charges to production orders are made for the actual cost of direct materials and direct labor and an estimated amount of factory overhead. The total cost charged to production orders is transferred from work in process accounts to Finished Goods when jobs are completed. The cost of finished goods which are sold is transferred from the account, Finished Goods, to Cost of Goods Sold.

EXHIBIT 53

APPLIED FACTORY OVERHEAD ANALYSIS SHEET No. 3

Month: March Overhead rate: 50¢ per hour.

Date	Production order No.	Hours of direct labor	Amount of overhead applied
10	1064	20	$10
		20	$10

During the accounting period a credit balance, which represents the amount of overhead applied to production by means of the predetermined overhead rate, is accumulated in the Applied Factory Overhead account. At the end of each accounting period the account is closed into the Overhead Variance account where it is compared with the actual factory overhead for the period.

Accounting for Actual Factory Overhead. A controlling account in the general ledger termed Factory Overhead Control may be used to accumulate actual factory overhead costs. This controlling account, which summarizes the total factory overhead costs, should be supported by a subsidiary ledger composed of standing orders or analysis sheets, with a separate sheet for each type of factory overhead cost. The form of the standing orders or analysis sheets will vary with the needs of the individual concern. It is suggested that a form which contains columns for Actual, Budget, and Variance be used. The Budget columns are recommended because, in determining the overhead rate in advance of the period, it is necessary to prepare a budget estimate of overhead for each month of the budget period and it is a convenient means of comparing budget estimates which are inserted in the standing orders at the beginning of each month with the actual costs which are inserted at the end of the month.

A standing order, such as the one suggested for supplies, Exhibit 54 could be prepared for other variable costs such as indirect labor, power, repairs, heat, and insurance. Since the budget estimates and actual charges should be identical for certain fixed overhead costs, such as rent, taxes, depreciation, and insurance, standing orders for costs of an unchanging character will not require Budget and Variance columns.

STANDING ORDER No.____ SUPPLIES

Date	January			February			Total		
	Actual	Budget	Variance	Actual	Budget	Variance	Actual	Budget	Variance

Exhibit 54. Standing order for supplies.

The accounting procedure involved in the accumulation of actual factory overhead costs varies with the individual business enterprise. Requisitions for supplies may be totaled daily, weekly, or monthly. Subsidiary record entries are made in the Issued section of individual stock ledger accounts, and a summary entry is made in the standing order for supplies. The journal entry summarizing a week's or a month's consumption of supplies is as follows:

Factory Overhead Control	xxx	
Materials Control		xxx

Indirect labor is recorded daily on time tickets and payroll sheets. A summary of indirect labor as shown in weekly payroll sheets can be charged to the indirect labor standing order. The weekly or monthly journal entry for the total indirect labor for the period is as follows:

Factory Overhead Control	xxx	
Payroll Control		xxx

During each monthly period such items as repairs, rent, light, telephone, telegraph, and taxes are vouchered and entered in the voucher register as a charge to Factory Overhead Control, for which a column should be provided. Each voucher can be recorded in the standing order for the particular overhead cost at the time it is entered in the voucher register. At the end of each month, or more frequently, the total of the column in the voucher register for Factory Overhead Control is posted to the general ledger account Factory Overhead Control.

At the end of each month additional charges are made to the Factory Overhead Control account through the medium of adjusting journal entries. Typical of the group are adjustments for depreciation, insurance expired, and accrued taxes payable. The combined journal entry required for such adjustments is as follows:

Factory Overhead Control	xxx	
Accumulated Depreciation for Factory Building		xxx
Accumulated Depreciation for Machinery		xxx
Prepaid Insurance		xxx
Accrued Taxes Payable		xxx

The appropriate standing order is charged for the amount of each overhead cost recognized at the end of the period.

At the end of each month the Factory Overhead Control account has total debits which should be equal to the sum of the amounts charged to standing orders during the period.

Factory Overhead Variance Account. During the month the amount of overhead applied to production orders is recorded as credits in the Applied Factory Overhead account and as debits to Factory Overhead in Process. The Factory Overhead Control account provides a summary of actual overhead costs as a debit balance for the month. The Factory Overhead Variance account is used to accumulate the difference between the actual and applied overhead costs. The following journal entry may be made at the end of the accounting period to record a variance resulting from actual overhead costs being in excess of the amount of overhead applied to production by means of the overhead rate:

Applied Factory Overhead	xxx	
Factory Overhead Variance	xxx	
Factory Overhead Control		xxx

The analysis and disposition of factory overhead variances are discussed and illustrated in the next chapter.

Diagram of Job Order Cost Accounting for Enterprises Not Departmentalized. Establishments, such as garages, printing shops, and machine shops, where departmentalization is impossible or impractical, may use effectively a simple plan of budgetary control with a single predetermined overhead rate. Two types of budgets need to be prepared, *viz.*, a detailed estimate of overhead and a budget of production in terms of direct labor hours or direct labor costs. The budget period may be a month, a quarter, a 6-month period, or a year. If the company is susceptible to seasonable variations in production or overhead costs, a long budget period, preferably a year, should be used.

The accompanying chart, Exhibit 55, is employed as a means of illustrating the general ledger and the subsidiary record relationships, discussed in the present chapter in connection with job order cost accounting for enterprises which are not departmentalized. General ledger controlling accounts are shown above the horizontal line extending across the page, while the subsidiary records are presented below the line.

Job Order Cost Problem Illustrated. The summary journal entries for enterprises which are not departmentalized are illustrated in the following problem and its solution.

Illustrative Problem

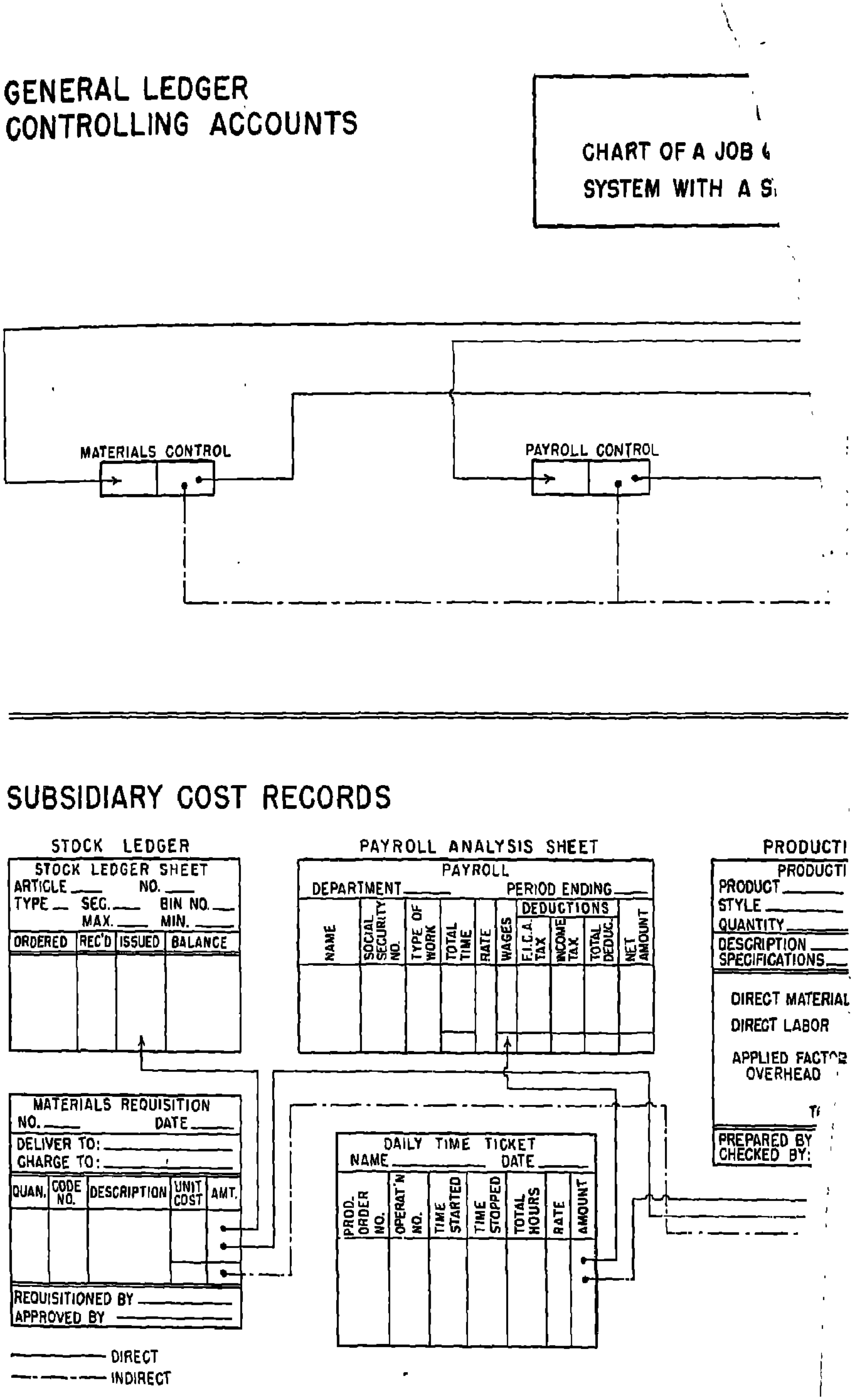
The Lehman Foundry operates as a single production department and processes jobs according to special order. The balance sheet of the company on Jan. 1, 19—, after a year of operation is as follows:

BALANCE SHEET OF LEHMAN FOUNDRY
Jan. 1, 19—

Assets			*Liabilities and Capital*	
Cash		$10,000	Vouchers payable	$ 5,000
Accounts receivable		7,000	Bank loan	10,000
Materials and supplies		9,000	Capital stock	35,000
Finished-goods inventory		4,000	Earned surplus	2,600
Machinery and equipment	$25,000			
Less: Accumulated depreciation	2,400	22,600		
		$52,600		$52,600

The budget for the year shows a total estimate of $48,000 for overhead costs and 120,000 direct labor hours of production. The following transactions occurred during January:

1. Materials and supplies purchased on account, $8,000.
2. Direct materials requisitioned for use in production, $4,500.
3. Supplies issued from the stockroom, $500.
4. Payroll vouchered and paid: direct labor, $2,500; indirect labor, $1,000.
5. Overhead costs vouchered and paid: rent, $200; repairs, $50; utilities, $300.
6. Adjusting entries were made to recognize the following unrecorded costs: depreciation of machinery and equipment, $200; taxes accrued, $150.
7. Direct labor hours applied to work in process during the month totaled 5,750.
8. All work completed during the month was transferred to finished stock.
9. Work in process inventory as of Jan. 31: materials, $500; labor, $300; overhead, $200.


GENERAL LEDGER
CONTROLLING ACCOUNTS
CHART OF A JOB
SYSTEM WITH A S
MATERIALS CONTROL
PAYROLL CONTROL
SUBSIDIARY COST RECORDS
STOCK LEDGER
STOCK LEDGER SHEET
ARTICLE
NO.
TYPE
SEC.
BIN NO.
MAX.
MIN.
ORDERED
REC'D
ISSUED
BALANCE
PAYROLL ANALYSIS SHEET
PAYROLL
DEPARTMENT
PERIOD ENDING
NAME
SOCIAL SECURITY NO.
TYPE OF WORK
TOTAL TIME
RATE
WAGES
DEDUCTIONS
F.I.C.A. TAX
INCOME TAX
TOTAL DEDUC.
NET AMOUNT
PRODUCTI
PRODUCTI
PRODUCT
STYLE
QUANTITY
DESCRIPTION
SPECIFICATIONS
DIRECT MATERIAL
DIRECT LABOR
APPLIED FACTOR OVERHEAD
PREPARED BY
CHECKED BY:
MATERIALS REQUISITION
NO.
DATE
DELIVER TO:
CHARGE TO:
QUAN.
CODE NO.
DESCRIPTION
UNIT COST
AMT.
REQUISITIONED BY
APPROVED BY
DAILY TIME TICKET
NAME
DATE
PROD. ORDER NO.
OPERAT'N NO.
TIME STARTED
TIME STOPPED
TOTAL HOURS
RATE
AMOUNT
DIRECT
INDIRECT

10. Finished goods inventory as of Jan. 31, $2,000.

11. Selling price of goods sold during the month, $12,000. All sales were made on a cash basis.

12. The variance between actual and applied overhead was analyzed and found to be due to seasonal conditions and is to be treated as a deferred charge pending counteracting conditions in subsequent months.

Prepare journal entries to record the transactions of the month and to close the books as of Jan. 31. (Omit payroll taxes and withholdings.)

Solution

LEHMAN FOUNDRY

Journal

(1)		
Materials Control	$ 8,000	
Vouchers Payable		$ 8,000
(2)		
Materials in Process	$ 4,500	
Materials Control		$ 4,500
(3)		
Factory Overhead Control	$ 500	
Materials Control		$ 500
(4)		
Labor in Process	$ 2,500	
Factory Overhead Control	1,000	
Payroll Control		$ 3,500
(4a)		
Payroll Control	$ 3,500	
Vouchers Payable		$ 3,500
(4b)		
Vouchers Payable	$ 3,500	
Cash		$ 3,500
(5)		
Factory Overhead Control	$ 550	
Vouchers Payable		$ 550
(5a)		
Vouchers Payable	$ 550	
Cash		$ 550
(6)		
Factory Overhead Control	$ 350	
Accumulated Depreciation		$ 200
Accrued Taxes Payable		150
(7)		
Factory Overhead in Process	$ 2,300	
Applied Factory Overhead		$ 2,300
(8)		
Finished Goods Inventory	$ 8,300	
Materials in Process		$ 4,000
Labor in Process		2,200
Factory Overhead in Process		2,100

(9)		
Work in Process Inventory	$ 1,000	
Materials in Process		$ 500
Labor in Process		300
Factory Overhead in Process		200
(10)		
Cost of Goods Sold	$10,300	
Finished Goods Inventory		$10,300
(11)		
Cash	$12,000	
Sales		$12,000
(12)		
Factory Overhead Variance	$ 100	
Applied Factory Overhead	2,300	
Factory Overhead Control		$ 2,400
(13)		
Profit and Loss	$10,300	
Cost of Goods Sold		$10,300
(14)		
Sales	$12,000	
Profit and Loss		$12,000
(15)		
Profit and Loss	$ 1,700	
Earned Surplus		$ 1,700

CHAPTER X

JOB ORDER COSTS: DEPARTMENTALIZATION; ANALYSIS AND DISPOSITION OF VARIANCES

Departmentalization as an Aid to Management. Managers of progressive manufacturing enterprises have come to recognize the need of functional departmentalization and the value of accumulating costs by service and production departments or centers within their factories. The advantages of departmentalization include more minute division of labor and specialization of tasks, logical layout and flow of work, scientific selection of personnel, assignment of responsibility and authority, and establishment of operating standards of efficiency. A complete system of cost accounting, through the collection of cost data and the establishment of standards of efficiency for each department, is a definite aid in the use of each of these managerial efficiency devices.

In manufacturing divisions where job order cost systems are in use, the accumulation of overhead by both service and production departments has been undertaken. This has paved the way for the replacement of a single overhead rate for the entire factory by a separate rate for each department, which permits the use of more scientific bases for the application of overhead costs to production. In most concerns conditions of production vary to such an extent from department to department that any one overhead rate for the entire plant is ineffective. For example, Dept. Y may be a drilling department with 10 automatic drilling machines and 3 machine operators, while Dept. X may be an assembly process, employing 12 highly paid, skilled workers. If a general overhead rate based on the direct labor hour method or direct labor cost method is in use, a small amount of overhead will be apportioned to the production passing through Dept. Y even though the overhead costs for this production center are large, depreciation alone being a sizable item. Large amounts of overhead will be applied to the production of Dept. X because direct labor constitutes the important element of the work. Obviously machine-hours is a better base for Dept. Y, while direct labor hours can be used satisfactorily for Dept. X. The use of separate bases for each division necessitates the accumulation of both overhead costs and production by departments or production centers. If overhead rates are to be employed daily, as the production progresses through the plant, they must be predetermined rates computed before the beginning of the accounting period through the use of budgets.

Industrial executives, public accountants, and cost accounting technicians are advocating the use of predetermined, departmental overhead rates, with such methods as direct labor hours, machine-hours, and direct labor costs being given the most favorable consideration. More explicitly, these plans provide for the application of the factory overhead for each department to the production of that department by means of carefully computed predetermined rates which may be expressed as follows:

$$\frac{\left\{\begin{matrix}\text{Estimated overhead for}\\ \text{Dept. X for budget period}\end{matrix}\right\}}{\left\{\begin{matrix}\text{Estimated direct labor hours for}\\ \text{Dept. X for budget period}\end{matrix}\right\}} = \left\{\begin{matrix}\text{rate per direct}\\ \text{labor hour}\end{matrix}\right\} \tag{1}$$

$$\frac{\left\{\begin{matrix}\text{Estimated overhead for}\\ \text{Dept. Y for budget period}\end{matrix}\right\}}{\left\{\begin{matrix}\text{Estimated machine-hours for}\\ \text{Dept. Y for budget period}\end{matrix}\right\}} = \left\{\begin{matrix}\text{rate per}\\ \text{machine-hour}\end{matrix}\right\} \tag{2}$$

$$\frac{\left\{\begin{matrix}\text{Estimated overhead for}\\ \text{Dept. Z for budget period}\end{matrix}\right\}}{\left\{\begin{matrix}\text{Estimated direct labor cost for}\\ \text{Dept. Z for budget period}\end{matrix}\right\}} = \left\{\begin{matrix}\text{rate per dollar}\\ \text{of direct labor cost}\end{matrix}\right\} \tag{3}$$

$$\frac{\left\{\begin{matrix}\text{Estimated overhead for}\\ \text{Dept. O for budget period}\end{matrix}\right\}}{\left\{\begin{matrix}\text{Estimated production in terms of units,}\\ \text{pounds, etc., for Dept. O for budget period}\end{matrix}\right\}} = \left\{\begin{matrix}\text{rate per unit}\\ \text{of production}\end{matrix}\right\} \tag{4}$$

All these methods may be in use in any one factory; the existing conditions of production in each department determine the method to be employed.

Plan of Accounting When Departmental Rates Are Used. In this type of cost system, as was the case in the simpler plan introduced in the previous chapter, direct materials and labor are charged to production as they are consumed. To facilitate a detailed analysis of costs, a Materials in Process account, a Labor in Process account, and a Factory Overhead in Process account are maintained in the general ledger as controlling accounts for production orders which follow the actual production through manufacturing processes. Production orders should contain sections to show direct materials cost, direct labor cost, and the applied overhead cost for each productive department.

Exhibit 56 illustrates a production-order form containing a departmental classification of direct material, direct labor, and applied factory overhead costs. The form can be used in business enterprises which maintain separate production departments.

Direct materials are requisitioned from the stockrooms, and the requisitions are used as a basis for entries in the departmental sections of the production orders used on each job, while corresponding entries are made in the Issued section of the stock ledger accounts. Periodically, direct

EXHIBIT 56
PRODUCTION-ORDER FORM FOR DEPARTMENTALIZED PLANTS

PRODUCTION ORDER (COST SHEET)

Model__________
Style__________
Quantity__________
For__________

Production order No.__________
Sales order No.__________
Date wanted__________
Date started__________
Date completed__________
Contract price__________

Description:
Specifications:

DIRECT MATERIALS

Date	Req. No.	Purchase order No.	Dept. I	Dept. II	Dept. III

DIRECT LABOR

Date	Dept. I		Dept. II		Dept. III	
	Hours	Amount	Hours	Amount	Hours	Amount

APPLIED OVERHEAD COST

Date	Dept. I		Dept. II		Dept. III	
	Machine hours	Amount	Labor hours	Amount	Labor hours	Amount

SUMMARY OF COST

Dept.	Direct materials	Direct labor	Applied overhead cost	Total cost
I				
II				
III				

material requisitions are summarized, the Materials in Process account is debited, and the Materials Control account is credited through the medium of a general journal entry.

Daily time tickets or time reports are used as a basis for entries for direct labor in the departmental sections in production orders. These daily reports are also used by the payroll department in the preparation of weekly payroll sheets. Periodically, the total direct labor consumed in production, as shown in the payroll analysis sheets, is journalized as a debit to the Labor in Process account and as a credit to the Payroll Control account.

It is in the designing of the overhead structure that the departmental plan differs to a marked degree from the one presented in the preceding chapter. Exhibit 57 illustrates a plan of job order cost accounting for manufacturing enterprises which employ predetermined, departmental overhead rates. General ledger controlling accounts are shown above the horizontal line, and the subsidiary cost records that each account controls are presented below the line. The chart is explained in detail in the present chapter.

As a preface to a detailed explanation of departmental rates, the following outline is given of the general accounting procedures required: (1) preliminary to the beginning of the budget period, (2) during the accounting period, and (3) at the end of the accounting period. A discussion of each phase of the procedure follows the outline.

General Procedure Preliminary to the Beginning of the Budget Period:

a. The departmentalization of the factory into production and service centers according to production activities and services performed.

b. The preparation of production budgets containing estimates of the production for each department in terms of direct labor hours, machine-hours, or direct labor cost.

c. The preparation of factory overhead budgets showing the estimated overhead of each class, such as depreciation, taxes, supplies, rent, and indirect labor.

d. The allocation of the estimated factory overhead costs to the service and production departments. This results in the reclassification of the estimated overhead costs by service and production departments.

e. The allocation of the total estimated service departments' costs to production departments. At this point all estimated overhead costs are classified by production departments.

f. The selection and determination of a suitable overhead application rate for each department to be used during the budget period.

General Procedure during the Accounting Period:

a. Daily, as production is completed in each department, the use of the application rate for that department to apply overhead to production orders.

b. The accumulation of actual overhead costs through the voucher register, or journal, and the entry of these costs in total in the Factory Overhead Control account and in detail in primary standing orders.

General Procedure at the End of Each Month or Quarter:

a. The distribution of the factory overhead costs, which are summarized in the Factory Overhead Control account and shown in detail in the primary standing orders,

to the service and production departments and to the secondary standing orders according to the responsibility of each department for the incurrence of the overhead.

b. The apportionment in turn of the overhead costs of the service departments to production departments in accordance with the service rendered, the transfer being made in detail in the secondary standing orders.

c. The comparison of actual overhead for each production department with the amount of overhead which has been applied to production during the period for each department and the determination of departmental variances.

d. The analysis and disposition of the departmental variances.

e. The revision of the budgets and of overhead application rates for the remaining periods of the fiscal year.

Departmentalization of the Factory. Production in every well-organized factory of any size consists of a series of operations performed in departments or production centers. A production department or center from an administrative point of view consists of a designated area in the plant in which a convenient physical arrangement of machinery and workers and effective executive supervision are the prime considerations. From the point of view of cost control, the accumulation and application of factory overhead to production are the most important considerations; therefore similarity of machinery and processes or operations is the most important basis for a department or a production center. Each center becomes virtually a separate factory, an individual costing unit independent of other operations. The degree to which a factory may be divided into departments depends entirely upon how minute a plan of supervision and collection of cost data is necessary. The desire to limit the amount of clerical work and red tape will prevent departmentalization of a plant being carried to an extreme.

Departments should be divided into two classes, production centers and service centers. Production departments are centers where actual productive activities are performed. A battery of machines performing similar operations, an assembly process, an inspection process under the supervision of a foreman or job foreman, each may be classified as a production department. In some cases single machines or work benches may be designated as production departments. In any plant where production is done in an orderly and precise manner, it is possible and practical to establish production departments for the assignment of responsibility and for the accumulation of overhead.

In addition to production departments it is important for management to recognize the existence of service departments and to accumulate the costs of their maintenance. Certain departments, such as personnel, planning, maintenance, cost accounting, superintendance, stockrooms, and trucking, are accessory to production departments and are created to facilitate the manufacture of the products in the plant. Most of their activities are performed along such definite lines that departmentalization is relatively easy.

Preparation of Budgets and the Classification of Estimated Overhead by Departments. Although a number of types of budgets may be a requirement of the executive planning of the manufacturing operations of a concern, two classes of budgets, production and overhead budgets, are indispensable to the proper functioning of the system of predetermined overhead application.

The production budget should exhibit the estimated quantity of each type of product expected to be manufactured during the period. Supporting the budget there should be for each production department a working schedule showing the estimate of production in terms of direct labor hours, machine-hours, direct labor cost, or units of production, depending upon which basis best denotes the productive conditions in the department.

More complex problems arise in compiling the estimated overhead costs for each production department. Before the estimated overhead for each production department can be ascertained, the estimates of overhead must be classified by service and production departments according to the responsibility of each department for the incurrence of each overhead cost. This procedure must be followed by the reclassification of the estimated overhead of service departments by production departments, so that the total estimates of factory overhead are finally classified by production departments.

Since at the end of each budget period it is necessary to follow exactly the same process of closing the *actual* overhead costs to service and production departments and in turn of apportioning service department costs to the production departments, it seems advantageous to carry through the classifications of both estimated and actual costs on the same sheets, the standing orders. In Exhibit 57 the primary standing orders have Budget, Actual, and Variance columns for each month. After the estimated overhead costs of each class have been allocated to service and production departments, the primary standing orders exhibit in the Budget columns the amount of each type of cost apportioned to each department. Next, it is necessary to reclassify the estimated overhead in the departmental standing orders, there being a standing order for each service and production department. The standing order for each service department shows at this point the estimated costs of each class which it is forecasted will be necessary to maintain the department during the period; the standing order for each production department exhibits the estimated overhead assigned to that department. To reach the final goal, which is the total estimated overhead for each production department, it is necessary in turn to apportion the estimated overhead of each service department to the production departments. The allocation necessitates the use of distribution bases which measure the service rendered by each service department to other service departments and to production departments. The distribution of the estimated costs of service departments to the departments served should commence with the department which serves other departments to the greatest extent and which receives the least service from others. This order of distribution should be followed until all the estimated service department costs are assigned to producing departments.

After the estimated service department costs have been allocated to production departments and have been entered in the Budget column of the standing orders for production departments, each standing order exhibits estimated overhead composed of costs assigned directly to the department and the share of the estimated cost of each service department distributed to this department. The total of the estimated overhead for each production department is then available for use in computing the predetermined departmental overhead rate.

The estimated cost data presented in the Budget columns of the service and production departments' standing orders should be invaluable to management as a guide in the control of the variable overhead expenditures during the budget period. Each department executive should be supplied with a copy of the standing order, or with a budget showing the estimated costs of each class, for the budget period for his department. The actual attainment of the budget for each department is the goal of both departmental and major executives.

Selection of Departmental Overhead Rates. The next step in the development of the overhead application procedure is the computation of a rate for each production department. The estimated overhead for each department is divided by a base such as the estimated direct labor hours, machine-hours, direct labor cost, or production in terms of units for the department.

The department rates should be normal rates. As was explained in the preceding chapter, overhead costs and production vary from month to month owing to seasonal conditions.

If the plant is departmentalized so that centers with similarity of machine or labor operations are designated as production departments, the selection of an overhead rate for each production department is not a difficult problem. Two important considerations are equitableness and practicability of the method to be used.

If a production department is composed primarily of skilled workers who are paid on a straight-time basis with more than one rate of pay existing, the most equitable base for the application of overhead to the production of the department is direct labor hours. Overhead costs accrue on the basis of time and each worker consumes approximately equal amounts of service for which overhead costs are incurred. The labor-hour method is representative of the time factor.

Similarly, if a department contains workers of varying speed and skill and a piece-rate system is used as a means of equalizing the productive activity of workers, the labor-hour rate is the most equitable method, because each worker, regardless of productive ability, enjoys an equal amount of plant facilities whose existence necessitates the incurrence of overhead costs.

If a single, uniform product is processed in a production department, regardless of whether the prime factor is skilled labor or machines, the number of units, in terms of products, tons, pounds, thousand feet, or gallons, constitutes a practical method of overhead application. The overhead rate is an amount in dollars per unit.

Increasingly important as an overhead application basis is the number of machine-hours in a production department. The machine-hour method adheres to the principle of applying overhead on the time factor. The method is used successfully in departments in which machines are the predominant production factor and in which depreciation, repairs, machine supplies, power, and other overhead costs, incurred in the operation of the machines, are the most important elements of overhead cost in the department. However, the use of a single machine-hour rate is not satisfactory when a production department contains a number of machines which vary in original cost, repairs, power consumption, and productivity. In such cases machine-hours as a time factor result in inequitable application of overhead to production orders. As a result departments which contain dissimilar machines should be further subdivided into machine centers. Instead of a single machine-hour rate for each department an overhead rate is computed for each machine or for each group of machines of the same type.

Individual Machine-hour Rates. Each machine, whether a mammoth draw press (the biggest machine in the automobile industry) or a comparatively small machine such as a stationary electric drill, may be designated as a cost center, and an overhead rate may be computed for the machine. If several machines of the same type are in use, the group or battery of machines may be specified as a cost center, and a rate can be calculated for the group.

The machine-hour rate is computed by dividing the estimate of the machine-center factory overhead for the budget period by the estimated number of hours which the production budget shows the machine or machines will be operated during the period. The estimate of overhead requires minute budget procedure, since it entails the breakdown of the estimate of factory overhead by machine centers. Estimates of hours of machine operation are obtained by an analysis of the machine capacity and of the expected production as shown in the production budget.

During the accounting period individual machine-hour rates are used to apply overhead for each machine or group of machines to production orders for jobs processed. At the end of each period actual factory overhead costs are distributed among cost centers, which are comprised of individual machines or groups of machines. The actual overhead for each machine center is compared with the amount of overhead applied to production for the center; the resulting variance should be analyzed and disposed of in the same manner as are other types of overhead variances.

Composite Machine-hour Rate. In some industries a composite machine-hour rate, which includes both labor and overhead costs, is compiled for each production center or department. Conditions that warrant composite rates are found in industries such as papermaking where labor operations are so closely integrated with machine operations that it is not practical to separate direct labor costs from overhead costs in determining the cost of a job. In the paper industry, processing is done on machines that cost from \$800,000 to \$2,000,000 each by a group of 6 to 10 men assigned to each machine. Depreciation, repairs, and other operating costs represent a relatively higher cost than labor cost as contrasted with most industries.

The composite machine-hour rate is computed for each machine or cost center at the beginning of the budget period by means of the following formula:

$$\frac{\left\{\begin{array}{r}\text{Estimated labor costs} + \text{estimated overhead}\\ \text{costs for Dept. M for budget period}\end{array}\right\}}{\left\{\begin{array}{l}\text{Estimated machine-hours}\\ \text{for Dept. M for budget period}\end{array}\right\}} = \left\{\begin{array}{l}\text{composite}\\ \text{machine-hour}\\ \text{rate}\end{array}\right\}.$$

Production orders that are prepared for departments using the composite machine-hour rate show only two costs: material costs and a combined applied factory labor and overhead cost. In the general ledger there would be no Labor in Process account; a Factory Labor and Overhead account for each production department would be substituted for the Factory Overhead Control account; an Applied Factory Labor and Overhead account would replace the Applied Factory Overhead account for each department; and a variance at the end of the accounting period would represent the difference between the actual and applied labor and overhead costs.

COST CONTROLLING ACCOUNTS AND SUBSIDIARY RECORD RELATIONSHIPS

The general plan of accounting described in the preceding chapter in connection with enterprises not departmentalized can be used in enterprises in which departmental overhead application rates are employed. The differences in the two systems arise in the treatment of factory overhead costs.

In designing an accounting procedure for factory overhead, it is essential to maintain records which will show the amount of factory overhead applied to the production processed in each production department; the actual factory overhead costs by type; the actual factory overhead assignable to each service and production department; and the variance between the applied and actual factory overhead for each production department.

If the enterprise is not divided into too numerous service and production departments, it is advantageous to follow the plan illustrated in the chart, Exhibit 57. An applied factory overhead account is maintained in the general ledger for each production department to accumulate the overhead applied to production orders passing through the particular production departments. A controlling account termed Factory Overhead Control is used to summarize actual overhead incurred during the accounting period. The account is supported by a group of standing orders composed of an analysis sheet for each type of cost, classified by service and production departments. A controlling account is maintained in the general ledger for each service and production department, while a standing order or analysis sheet for each department is used as a subsidiary record to show in detail the actual overhead required to maintain the department. A variance account for each production department is also carried in the general ledger to show the monthly variance between the actual and applied overhead for each production department.

In the present chapter the above plan of general ledger accounts is employed in explaining the accounting treatment for factory overhead, because it is a convenient method of showing clearly the accounting relationships involved. However, it should be emphasized that other plans of general ledger and subsidiary record relationships may be more advantageous in an individual enterprise. If there are more than 10 or 15 service and production departments, it would burden the general ledger unnecessarily to have one account for each service department and three accounts, *viz.*, an applied overhead account, an actual overhead account, and a variance account, for each production department.

Either of two alternatives may be adopted to relieve the general ledger of a large number of departmental accounts. In lieu of three accounts for each production department, a single overhead account, such as Factory Overhead Control, Dept. A, may be used for each production department. During the accounting period the account would be credited for the amount of overhead applied to the production of the department; at the end of the period the account would receive debits representing actual overhead allotted to the department; and the difference between the actual and applied overhead for the department would appear as a debit or credit balance in the department account. Thus only one account for each production department would be necessary in the general ledger.

A second plan, which is practical in large enterprises with a large number of departments, requires the use of five controlling accounts in the general ledger to summarize factory overhead transactions. One account, termed Applied Factory Overhead, can be used to summarize all of the overhead applied for production departments. A subsidiary record would be required to summarize the amount of overhead applied to the production of each production department. In the accumulation of actual factory overhead, controlling accounts, termed Factory Overhead Control, Service Departments Control, and Production Departments Control, could be employed; the detail of accumulating actual factory overhead costs by type and of reclassifying the data by service and production departments could be shown in standing orders or analysis sheets, maintained for each type of cost and each department. A single account, termed Factory Overhead Variance, could be used to show the variance between actual and applied overhead, and this account would control a group of analysis sheets showing the amount of variance for each production department.

Accounting for Applied Departmental Overhead Rates. During the budget period, as production is completed in each production department or machine center, production orders are used as a medium for the collection of direct materials cost, direct labor cost, and applied overhead for each production department. The predetermined overhead rate for each production department is used to apply the estimated overhead to production orders immediately after the work is completed in the center. For example, if the method of overhead application for Dept. A is the direct labor hour plan and the normal overhead rate is $0.50 per direct labor hour, a production order, which indicated that 10 hr. had been required to complete the work in Dept. A, will receive applied overhead of $5.

APPLIED OVERHEAD ANALYSIS SHEET No.__________

Department__________ Department rate__________

Date	Production order No.	Hours of direct labor	Amount of applied overhead

Exhibit 58.

Production orders generally follow production from department to department. Thus it is advantageous to maintain an applied overhead analysis sheet for each department to accumulate the amount of overhead applied to production orders during the period. A form of applied overhead analysis sheet is suggested as Exhibit 58.

Once a month, or more frequently, the applied overhead analysis sheet for each production department is totaled and the following journal entry is made:

Factory Overhead in Process	xxx	
Applied Factory Overhead, Dept. A		xxx
Applied Factory Overhead, Dept. B		xxx
Etc.		

The Factory Overhead in Process account, together with the Materials in Process and Labor in Process accounts, is credited, and the Finished Goods account is debited, for the total cost of jobs completed during the period. At the end of the month the balances remaining in the three work in process accounts should be equal to the total amount of direct materials, direct labor, and applied factory overhead charged to production orders which represent uncompleted jobs remaining in process.

The Applied Factory Overhead account for each production department has a credit balance until the end of the month, when it is closed into the Overhead Variance account for the department in question, which makes possible a comparison between the actual and the applied overhead for the period.

Accumulation and Classification of Actual Overhead by Departments. During the accounting period the actual overhead costs for the factory are summarized in the Factory Overhead Control account in the ledger and are shown in detail in the standing orders which support the controlling account. The accumulation of actual overhead for factories operating as departmentalized organizations is identical with the accounting procedure described in the preceding chapter for enterprises not departmentalized, with the exception of a detailed classification of costs by departments in the standing orders. It will be remembered that overhead vouchers are entered in the voucher register as a charge to Factory Overhead Control in the column provided for that account; requisitions for supplies are summarized, and the total cost is charged to Factory Overhead Control and credited to Materials Control; payrolls are analyzed, and a debit is made to Factory Overhead Control and a credit to the Payroll Control account; and, at the end of the accounting period, adjusting journal entries are made charging Factory Overhead Control and crediting such accounts as Accumulated Depreciation, Prepaid Insurance, and Accrued Taxes.

However, when service and production departments are used as costing units, the standing orders must be prepared so as to show an analysis of costs in terms of departments.

Management should have available in the standing orders supporting the general ledger account, Factory Overhead Control, the total amount of each class of cost and the classification of each cost by service departments and production departments. A standing order is required for each type of cost, such as supplies, indirect labor, rent, insurance, taxes, and depreciation. As a matter of convenience this group of standing orders is termed "primary standing orders." A form of primary standing order is suggested as Exhibit 59.

This form of primary standing order contains columns for Budget and Variance in addition to an Actual column. The Budget column is added so that estimates of costs which are contained in budgets of factory overhead can be inserted at the beginning of the budget period in order that actual and budget figures may appear in the same sheets and a variance for each cost and department will be available to management at the end of the period.

STANDING ORDER No. 10 Supplies

Departments	January			February			Total		
	Actual	Budget	Variance	Actual	Budget	Variance	Actual	Budget	Variance
Service departments:									
Planning..................									
Trucking..................									
Stockroom..................									
Payroll..................									
Superintendent's office.......									
Production departments:									
A..................									
B..................									
C..................									
D..................									
Total..................									

Exhibit 59. Primary standing order for supplies.

Distribution of Factory Overhead to Departments. The distribution of each overhead cost to service and production departments can be made in the primary standing orders at the end of the accounting period. A few costs can be allotted directly to departments in accordance with the service rendered, but the majority must be allocated through the use of bases which are equitable and practical. Distribution bases for the allocation of overhead to service and production departments are listed in Exhibit 60.

After the distribution of the actual overhead to the service and production departments has been completed, the primary standing orders show in the Actual columns the factory overhead classified by departments. The estimated overhead costs of each class for the month, classified by departments, were recorded in the Budget columns of the primary standing orders at the beginning of the period, so that a detailed comparison may be made of the actual and estimated figures for the month and the variances carried into the Variance columns may be noted.

Service and Production Department Costs. Whether or not an account in the general ledger is maintained to show the total operating costs of each service and production department depends entirely upon the number of such department accounts and upon the policy of the concern as to the accounts needed in the general ledger for control purposes. In the present explanation, it is assumed that there is an account in the general ledger for each service and production department.

EXHIBIT 60

DISTRIBUTION BASES FOR ALLOCATION OF BOTH ESTIMATED AND ACTUAL OVERHEAD TO SERVICE AND PRODUCTION DEPARTMENTS

Overhead Cost	Bases of Distribution
Electric power and light	A survey of the number, size, and hours of operation of electric lights, fans, power machinery, and elevators for each department
Fuel	Charge directly to power plant or heating department on basis of estimated or actual fuel needed
Labor	Estimated or actual labor cost in each department
Materials and supplies	Estimated or actual costs of supplies requisitioned by each department
Liability and compensation insurance	Number of employees, or classification of employees according to risk or insurance rate for each department
Perishable tools	Estimated or actual cost of tools used by each department
Repairs	Estimated or actual repair costs in each department
Spoiled work	Estimated or actual spoiled work for each department
Telegraph	Estimated or actual telegraph charges to each department
Telephone	Number of telephones in each department
Water	Estimate of consumption in fountains, in washrooms, and by water-driven machinery in each department
Depreciation on building	Square feet or value of space occupied by each department
Depreciation on machinery and equipment	Valuation and rate of depreciation on the machinery and equipment in each department
Fire insurance on building	Square feet or value of space used by each department
Rent	Square feet or value of space used by each department
Taxes on building	Square feet or value of space used by each department
Taxes on equipment	Value of equipment in each department
Taxes on trucks	Charged directly to trucking department

A group of analysis sheets, termed secondary standing orders, are recommended as records subsidiary to the service and production department accounts in the general ledger. The secondary standing orders differ from the previously explained primary standing orders only in classifying overhead costs. The primary standing orders consist of an analysis sheet for each type of overhead cost, showing the amount assignable to each service and production department. The secondary standing orders consist of an analysis sheet for each service and production department, showing the amount of each type of cost charged to the department. The primary group classifies overhead by type, but the secondary group reclassifies the same costs in such a way as to show the list of costs for each department. The two forms of classification permit management to analyze overhead first by type and second by each service and production department.

Exhibit 61 illustrates a secondary standing order for a service department; Exhibit 62 represents a secondary standing order for a production department.

It will be noted that the standing orders for service departments are identical with those for production departments with one exception. The standing orders for service departments receive apportioned charges from a few other service departments, but a share of each service department is charged to production departments. Thus, since the planning department receives service from such departments as personnel, payroll, building service and the superintendent's office, a portion of the cost of maintaining each of these departments is allocated to the planning department. In turn, when service departments are distributed to production departments, the apportioned-charges section of the production-department standing orders receives a share of each service department cost.

STANDING ORDER No. 21 **Service department: Planning**

Costs	January			February			Total		
	Actual	Budget	Variance	Actual	Budget	Variance	Actual	Budget	Variance
Fixed:									
Taxes									
Rent									
Depreciation									
Variable:									
Indirect labor									
Indirect materials									
Apportioned department charges									
Personnel									
Payroll									
Accounting									
Superintendent's office									
Building service									
Total									

Exhibit 61. Secondary standing order for a service department.

Transfer of Factory Overhead to Departments. After all the actual overhead costs have been accumulated and classified by service and production departments in the primary standing orders, the amounts apportioned to each department are transferred to the actual columns of the secondary standing orders. A journal entry debiting each service and production department and crediting the Factory Overhead Control account is made in order to transfer all the actual overhead into the ment exhibits in detail both the estimated and actual overhead. Any variances between the two sets of figures are entered in the Variance columns.

Closing Actual and Applied Factory Overhead Accounts. It has been explained that during the accounting period the amount of overhead applied to production orders is recorded as a debit in the Factory Overhead in Process account with corresponding credits in the applied factory overhead accounts for the various production departments. Also during the accounting period the actual factory overhead is debited to the Factory Overhead Control account. At the end of the period the actual factory overhead is transferred to service and production department control accounts, and subsequently the service department control accounts are closed into the production department control accounts. The following journal entry illustrates the closing of the actual and applied factory overhead accounts for production departments and the setting up of the variance account for each production department:

Applied Factory Overhead, Dept. A	xxx	
Applied Factory Overhead, Dept. B	xxx	
Factory Overhead Variance, Dept. A	xxx	
Factory Overhead Variance, Dept. B		xxx
Factory Overhead Control, Dept. A		xxx
Factory Overhead Control, Dept. B		xxx

There remains the important managerial task of analyzing and determining the proper disposition of the variance between actual and applied overhead for each production department.

ANALYSIS AND DISPOSITION OF FACTORY OVERHEAD VARIANCES

Analysis of Factory Overhead Variances. An analysis of the variance will entail a comparison of the actual direct labor-hours (or other bases of application) with the estimated direct labor hours included in the production budget for this period, a detailed comparison of the actual and estimated overhead costs as shown in the standing orders, and an investigation of the external or internal conditions which might necessitate the revision of the overhead or production budgets for the remaining months in the budget period.

The analysis may show that the balances in the factory overhead variance accounts are due to one or all of the following causes:

a. The overhead rate, which is a normal rate, may be substantially correct, but actual overhead costs may always be large or small at this time of the year, owing to heavy repairs or other overhead costs.

b. Production, which is constantly fluctuating owing to seasonal conditions in the industry, may always be low or high during the period.

c. Estimated overhead, the numerator in the overhead formula for the computation of the overhead rate, may have been too low or too high, the resulting rate being too small or too large.

d. The estimated direct labor hours (or other base used), the denominator, may have been too large or too small, the resulting rate being too small or too large.

e. The actual overhead costs during this period may be unexpectedly large owing to repair expenditures necessitated by an uninsured fire loss, a flood, a windstorm, a boiler explosion, or other losses which have been incorrectly charged to the Factory Overhead Control account.

f. Production may be unexpectedly low during the period owing to such a temporary condition as a strike, inability to secure raw materials, or a boiler or machine breakdown.

g. Actual overhead costs may be unexpectedly reduced during this period by fortuitous circumstances such as a refund on a fuel or power bill.

h. Production may be unexpectedly high during the period owing to favorable weather conditions.

An illustration of a comparative analysis of estimated and actual overhead costs and production for four production departments for the first month of the budgeted period of 1 year is presented as Exhibit 64.

EXHIBIT 64

ANALYSIS OF ESTIMATED AND ACTUAL OVERHEAD COSTS AND PRODUCTION

January, 19__

	Departments			
	A	B	C	D
Differences between actual and budgeted overhead costs:				
Actual overhead costs for January	$2,897.80	$1,276.35	$1,075.10	$1,020.75
Estimated overhead costs for January as shown in budget	2,100.00	1,200.00	1,650.00	2,000.00
Under budget (favorable)			$ 574.90	$ 979.25
Over budget (unfavorable)	$ 797.80	$ 76.35		
Differences between actual and budgeted production:				
Actual production bases for January:				
Machine-hours	3,313			
Labor-hours		1,478	1,549.5	
Labor cost				$2,090.75
Estimated production bases for January as shown in budget	3,500	800	1,500	$2,000.00
Under budget	187			
Over budget		678	49.5	$ 90.75
Overhead rate	$ 0.60	$ 1.50	$ 1.10	100%
Underabsorbed by production (unfavorable)	$ 112.20			
Overabsorbed by production (favorable)		$1,017.00	$ 54.45	$ 90.75
Overhead variance as shown in ledger account	$ 910.00*	$ 940.65	$ 629.35	$1,070.00

* Indicates debit amount.

The formulas used in computing the normal overhead rates for the year are listed below. The division of the figures in the formulas by 12 provides the proportionate amounts used as budgetary estimates in Exhibit 64.

$$\text{Dept. A: } \frac{\$25{,}200 \text{ estimated overhead}}{42{,}000 \text{ machine-hours}} = \$0.60 \text{ per machine-hour}$$

$$\text{Dept. B: } \frac{\$14{,}400 \text{ estimated overhead}}{9{,}600 \text{ estimated direct labor hours}} = \$1.50 \text{ per direct labor hour}$$

$$\text{Dept. C: } \frac{\$19{,}800 \text{ estimated overhead}}{18{,}000 \text{ estimated direct labor hours}} = \$1.10 \text{ per direct labor hour}$$

$$\text{Dept. D: } \frac{\$24{,}000 \text{ estimated overhead}}{\$24{,}000 \text{ estimated direct labor cost}} = 100\% \text{ of direct labor cost}$$

Disposition of Overhead Variances Due to Seasonal Conditions. Generally variances will be due to seasonal conditions of overhead costs or production rather than to incorrect application rates. In case debit balances in the overhead variance accounts at the end of January are the result of large repairs or of other overhead expenditures (amounts which will be offset by few repairs or small expenditures in subsequent months) or are due to a low production for the month because of seasonal conditions, the adjustment should not be made either to Cost of Goods Sold or to inventories. These seasonal conditions were recognized when the normal application rate was computed. The normal overhead costs and the normal production for the year were estimated and used in computing overhead rates. Upon the assumption that benefit will accrue in future months from these underapplied overhead costs and that there will be overapplied overhead costs creating offsetting credit balances, the overhead variances may be considered as deferred charges to production and should be included among deferred charges in the balance sheet. At the end of the year, if the balances are not eliminated by offsetting variances in subsequent months, it may be assumed that the overhead rates were incorrect, and the variance accounts may be closed partly to Profit and Loss and partly to Surplus. If the books have been closed monthly, one-twelfth should be transferred to Profit and Loss and eleven-twelfths to Surplus.

Variance accounts with credit balances may have been created either because costs such as repairs are very low at the time of year or because production which is susceptible to seasonal conditions is always large at the time of year. These variances will be offset during other months; such fluctuations were provided for in budget estimates and in the preparation of the normal overhead rates. Therefore the correct disposition of the overhead variance accounts with credit balances caused by seasonal conditions is to consider the amounts as a deferred credit. The accounts should be allowed to remain open in the ledger until the end of the year and should be shown monthly in the Deferred Credit section of each balance sheet. At the end of the year, if the credit balance has not been offset by debit variances in subsequent months, the accounts should be closed in part to Profit and Loss and partly to Surplus, since an unabsorbed balance is indicative of incorrect rates. An alternative treatment is to transfer the variance accounts to a Reserve for Overhead Variance, which could be shown monthly in the Surplus or Reserve section of the balance sheet until absorbed in subsequent months.

Disposition of Overhead Variances Due to Incorrect Overhead Rates. If either the estimated overhead was understated or the estimated direct labor-hours were overstated, an incorrect overhead rate was established and was used during the period to apply overhead to production orders. Since the overhead rate was too low, too small an amount of overhead was applied to production during the period with the result that the work in process inventory, the finished goods inventory, and the cost of goods sold are understated. A portion of the month's total production may be in process, another part may be in finished goods stock, and the balance may have been sold. Theoretically an additional amount of overhead should be added to the Factory Overhead in Process account, the Finished Goods account, and the Cost of Goods Sold account, the amount depending upon the proportion of the total production which remains in each of the three stages.

If either the estimated overhead was overstated or the estimated production base was understated, an incorrect overhead rate was established and was used during the period to apply overhead to production orders. With these rates in use, too large an amount of overhead has been applied to the production of the period. A portion of the overhead should be deducted from the Factory Overhead in Process account, the Finished Goods account, and the Cost of Goods Sold account, the amount depending upon the proportion of the total production which remains in each of the three stages.

The correction of production costs may involve the adjustment of subsidiary records by means of a supplementary rate, which necessitates the correction of the amount of overhead applied to each one of the production orders remaining in process, those representing finished goods, and those in the cost of goods sold file. A less exact but simpler method may approximate the same results by apportioning the variances according to the amount of the current period's production cost remaining in the Work in Process account, the Finished Goods account, and the Cost of Goods Sold account at the end of the period.

Variance Disposition by Supplementary Rate. Through the use of a *supplementary rate* an amount of overhead is added to or subtracted from each production order representing products processed during the period. A special section may be provided in each production order to show the addition or subtraction of overhead computed by means of the supplementary rate. The adjusted cost of each production order includes the amount of overhead applied to the order during the accounting period and a correcting amount of overhead entered at the end of the period. The supplementary rate is computed as follows:

$$\frac{\text{Total amount of variance due to incorrect overhead rate}}{\text{Total production in terms of direct labor hours (or other bases)}} = \text{supplementary rate}$$

The total actual direct labor hours, machine-hours, or other base is multiplied by the supplementary rate for each department in order to determine the amount of overhead to be added to or subtracted from the overhead costs in each production order. Controlling accounts are adjusted through the journal by an entry in the Cost of Goods Sold account for the total amount of supplementary overhead costs recorded in production orders for goods sold; by an entry in the Finished Goods account for the total amount of supplementary overhead costs added to production orders for goods completed but remaining in inventory; and by an entry in the Factory Overhead in Process or the Work in Process Inventory account for the total amount of supplementary overhead costs recorded in production orders uncompleted.

In order to illustrate the supplementary rate method, it is assumed in the following example that four production orders were processed in four production departments during the period. The overhead application base is shown in parentheses for each department.

Production order no.	Dept. A (machine-hours)	Dept. B (direct labor hours)	Dept. C (direct labor hours)	Dept. D (labor cost)
1	900	400	500	$700.00
2	800	350	550	700.00
3	850	350	400	690.75
4	763	378	99.5	None
Total.............	3,313	1,478	1,549.5	$2,090.75

The above totals are the denominators for the computation of supplementary rates; the following variances are the numerators:

	Variance
Dept. A...........	$728.00 Dr.
Dept. B...........	752.52 Cr.
Dept. C...........	503.48 Cr.
Dept. D..........	856.00 Cr.

The supplementary rates are as follows:

Dept. A	$0.22	per machine-hour
Dept. B	0.51	per labor-hour
Dept. C	0.325	per labor-hour
Dept. D	41%	of labor cost

The actual overhead bases, such as direct labor hours, machine-hours, and direct labor cost, multiplied by the supplementary rates provide the amount of supplementary overhead for the production orders as follows:

Production order no.	Supplementary overhead applied				
	Dept. A	Dept. B	Dept. C	Dept. D	Total
1	$198.00	$204.00	$162.50	$287.00	$455.50
2	176.00	178.50	178.75	287.00	468.25
3	187.00	178.50	130.00	282.00	403.50
4	167.00	191.52	32.23	None	56.75
Total....	$728.00	$752.52	$503.48	$856.00	$1,384.00

Department A had a debit balance in the variance account, therefore overhead should be added to the production orders; while Departments B, C, and D had credit variances, so that the overhead applied to these production orders should be reduced by the supplementary amount. If Production Orders 1 and 2 have been sold, Production Order 3 is completed and still on hand, and Production Order 4 is incomplete, the following journal entry is required to adjust the general ledger control accounts:

Factory Overhead Variance, Dept. B	$752.52	
Factory Overhead Variance, Dept. C	503.48	
Factory Overhead Variance, Dept. D	856.00	
Factory Overhead Variance, Dept. A		$728.00
Cost of Goods Sold		923.75
Finished Goods		403.50
Work in Process Inventory		56.75

Variance Disposition by Ratio Method. A postmortem, such as is provided by a supplementary rate, frequently is of little value because management has already made use of production order costs as a guide in formulating price policies and most of the products produced during the period have been sold by the end of the month. Another way to remedy the situation is to adjust the general ledger accounts in such a way as to avoid the detailed correction of subsidiary records. For example, it may be assumed that the month's production of $30,000 is in the following stages of completion at the end of the period: cost of goods sold, $18,000;

EXHIBIT 65

CHART ILLUSTRATING IMPORTANT GENERAL LEDGER AND SUBSIDIARY ENTRIES FOR JOB ORDER COST ACCOUNTING TRANSACTIONS

Transaction	General ledger entry	Business papers	Book of original entry	Entries in subsidiary cost records
Purchase of materials and supplies for stock	Dr. Materials Control Cr. Vouchers Payable	Voucher and invoice	Voucher register	Received section of stock ledger accounts
Purchase of special parts and raw materials for immediate use in factory production	Dr. Materials in Process Cr. Vouchers Payable	Voucher and invoice	Voucher register	Material section of production orders
Purchase of repair parts for emergency use in factory	Dr. Factory Overhead Control Cr. Vouchers Payable	Voucher and invoice	Voucher register	Standing order for repair costs
Material returned to supplier from stockroom	Dr. Vouchers Payable Cr. Materials Control	Debit memorandum and voucher	Journal	Red-ink entry in received section of stock ledger accounts
Payment of vouchers for materials	Dr. Vouchers Payable Cr. Cash	Voucher and invoice	Check register or cash disbursement book	None
Direct materials requisitioned from stockroom	Dr. Materials in Process Cr. Materials Control	Material requisitions	Journal	Material section of production order; issued section of stock ledger accounts
Indirect materials and supplies requisitioned from stockroom	Dr. Factory Overhead Control Cr. Materials Control	Material requisitions	Journal	Standing order for indirect materials; issued section of stock ledger accounts
Direct material returned to stockroom from factory	Dr. Materials Control Cr. Materials in Process	Material returned report	Journal	Red-ink entry in issued section of stock ledger accounts; adjustment of material cost on production order
Indirect materials and supplies returned to stockroom from factory	Dr. Materials Control Cr. Factory Overhead Control	Material returned report	Journal	Red-ink entry in issued section of stock ledger accounts; adjustment of indirect material standing order
Adjustment of inventory—physical inventory less than stock records	Dr. Factory Overhead Control Cr. Inventory Adjustment	Physical inventory sheets	Journal	Standing order for inventory adjustment; issued section stock ledger accounts
Adjustment of inventory—physical inventory greater than stock records	Dr. Inventory Adjustment Cr. Factory Overhead Control	Physical inventory sheets	Journal	Received section, stock ledger accounts; standing order for inventory adjustment
Distribution of payroll	Dr. Labor in Process (direct labor) Factory Overhead Control (indirect labor) Cr. Payroll Control	Payroll sheets, time and piece-rate reports	Journal	Labor section of production orders for direct labor cost; appropriate columns for service and production departments in indirect labor standing order
Vouchering of payroll	Dr. Payroll Control Cr. Vouchers Payable and other payroll withholding accounts	Voucher and payroll sheets	Voucher register	None
Payment of payroll	Dr. Vouchers Payable Cr. Cash	Voucher and payroll sheets	Check register or cash disbursement book	None
Vouchering factory costs for rent, power, repairs, etc.	Dr. Factory Overhead Control Cr. Vouchers Payable	Vouchers	Voucher register	Standing orders for rent, power, repairs, etc.
Recognition of expired insurance	Dr. Factory Overhead Control Cr. Prepaid Insurance	Analysis sheet for adjusting entries	Journal	Standing order for insurance
Recognition of accrued taxes	Dr. Factory Overhead Control Cr. Accrued Taxes	Analysis sheet for adjusting entries	Journal	Standing order for taxes

Recognition of depreciation	Dr. Factory Overhead Control Cr. Accumulated Depreciation	Schedule of depreciation rates	Journal	Standing order for depreciation
Distribution of factory overhead to service and production departments	Dr. Service and Production Departments (in detail) Cr. Factory Overhead Control	Standing orders for factory overhead	Journal	Standing orders for service and production departments
Distribution of service departments' costs to production departments	Dr. Production Departments (in detail) Cr. Service Departments (in detail)	Standing orders for service departments	Journal	Standing orders for service and production departments
Applying factory overhead to production orders by a single overhead rate	Dr. Factory Overhead in Process Cr. Applied Factory Overhead	Schedule showing computation of the overhead rate	Journal	Entry in applied factory overhead analysis sheet; entry in applied overhead section of production orders
Applying factory overhead to production orders by separate production department overhead rates	Dr. Factory Overhead in Process Cr. Applied Factory Overhead—Production Depts. A, B, C, etc.	Schedule of production departments' overhead rates	Journal	Entry in applied factory overhead analysis sheets for production departments; entry in departmental applied overhead sections of production orders
Defective or spoiled work taken out of process	Dr. Materials Control (scrap value) Factory Overhead Control Cr. Materials in Process Labor in Process Factory Overhead in Process	Spoiled and defective work reports	Journal	Value of scrap or spoiled work entered in received section of stock ledger accounts for scrap; production order marked "spoiled" and material, labor, and overhead loss is entered in standing order for spoiled work as a charge against appropriate production departments
Transfer of goods completed from production to finished goods	Dr. Finished Goods Cr. Materials in Process Labor in Process Factory Overhead in Process	Production orders and summary of cost of finished goods	Journal	Production orders marked completed; entry in received section of finished goods stock ledger accounts
Sale of finished goods	Dr. Cost of Goods Sold (cost) Cr. Finished Goods (cost)	Production orders; finished stock ledger	Journal	Entry in cost of sales analysis sheet; entry in issued section of finished goods ledger accounts
	Dr. Accounts Receivable (sales price) Cr. Sales (sales price)	Sales invoices	Sales Journal	Cost of sales analysis sheet
Transfer work in process from production accounts to work in process inventory	Dr. Work in Process Inventory Cr. Materials in Process Labor in Process Factory Overhead in Process	Production orders	Journal	None
Closing actual and applied factory overhead accounts and setting up variance accounts	Dr. Applied Factory Overhead, Depts. A, B, etc. Factory Overhead Variance, Depts., A, B, etc. Cr. Factory Overhead Control, Depts. A, B, etc.	None	Journal	None

CHAPTER XI

JOB ORDER COSTS: FINANCIAL AND COST STATEMENTS; SPECIAL PROBLEMS

FINANCIAL AND COST STATEMENTS

An indispensable part of any system of accounting is a program of monthly statements and reports to inform management of the current financial status of the company and of the progress made by, and the costs incurred for, each department and division. The number of statements and reports and their character differ according to the requirements of the management of each business enterprise. The following statements and supporting cost reports are commonly prepared each month for internal management purposes:

1. *Balance Sheet* (Schedule A).
2. *Profit and Loss Statement* (Schedule B) supported by statements of
   - *a.* Cost of Goods Sold (B-1).
   - *b.* Cost of Finished Goods Manufactured (B-2).
   - *c.* Actual and Applied Factory Overhead Costs and Variances (B-3).

Balance Sheet. A balance sheet prepared for a manufacturing enterprise is similar in form and content to the balance sheets of concerns engaged in merchandising activities, with two exceptions: the former requires three inventory accounts, raw materials, work in process, and finished goods; the asset classification contains fixed asset accounts and accumulated depreciation accounts for machinery and equipment, factory buildings, and patents. A form of balance sheet for a manufacturing concern (Schedule A) is presented as Exhibit 66. In preparation of the balance sheet, the assumption is made that a variance of $1,730 existed between the actual and applied factory overhead costs for January. In the analysis of this variance, which is shown in Exhibit 70, Statement of Actual and Applied Factory Overhead Costs and Variances on page 214, $346 is attributed to seasonal conditions and $1,384 to the use of incorrect overhead rates.

Since the variance of $346, attributed to seasonal conditions, represents a debit balance of $182 for Production Department 1 and credit balances totaling $528 for Production Departments 2, 3, and 4, a Deferred Factory Overhead Variance of $182 is shown among the current assets in the balance sheet, Exhibit 66, and a Deferred Factory Overhead Variance of $528 is listed among the current liabilities, because it is expected that both the deferred charge and the deferred credit will be offset by counteracting conditions in subsequent months.

EXHIBIT 66

LEONARD CABINET MANUFACTURING CO.

Schedule A

BALANCE SHEET
Jan. 31, 19__

Assets

Current assets:				
Cash			$17,950	
Accounts receivable		$ 8,000		
Less: Estimated uncollectible accounts		1,000	7,000	
Inventories:				
Materials		$12,000		
Work in process	$3,000			
Less: Factory overhead variance	138	2,862		
Finished goods	$9,000			
Less: Factory overhead variance	415	8,585		
Total inventories			23,447	
Deferred factory overhead variance			182	
Total current assets				$48,579
Fixed assets:				
Machinery and equipment			$25,000	
Less: Accumulated depreciation			2,600	22,400
Total assets				$70,979

Liabilities and Capital

Current liabilities:			
Vouchers payable		$13,000	
Accrued taxes		150	
Deferred factory overhead variance		528	
Total current liabilities			$13,678
Capital and earned surplus:			
Capital stock, common		$35,000	
Earned Surplus, balance Jan. 1, 19__	$13,771		
Net profit for January, 19__ (Schedule B)	8,530		
Earned Surplus, balance Jan. 31, 19__		22,301	
Total capital and earned surplus			57,301
Total liabilities, capital, and earned surplus			$70,979

The remaining variance balance of $1,384 was caused by the use of departmental overhead rates that were too high, which resulted in production orders for the period being costed with too much applied factory overhead. The subtractions of $138 from Work in Process Inventory and $415 from Finished Goods Inventory show the amount of variances which should be adjusted to inventories in order to correct production records. The balance of $831 is treated as a subtraction from Cost of

Goods Sold, since production orders representing goods completed and sold during the period were not properly costed.

Profit and Loss Statement and Supporting Schedules. The Profit and Loss Statement, Schedule B, Exhibit 67, is a summary statement of operations supported by a Statement of Cost of Goods Sold, Schedule B-1, Exhibit 68; a Statement of Cost of Finished Goods Manufactured, Schedule B-2, Exhibit 69; and a Statement of Actual and Applied Factory Overhead Costs and Variances, Schedule B-3, Exhibit 70.

Exhibit 67

Leonard Cabinet Manufacturing Co.

Schedule B

Profit and Loss Statement

Jan. 1 to Jan. 31, 19—

Net sales			$38,124
Less: Cost of goods sold (Schedule B-1)			20,169
Gross profit on sales			$17,955
Selling costs		$6,000	
Administrative costs		4,000	10,000
Net profit on sales			$ 7,955
Nonoperating income:			
Interest and dividends		$1,475	
Nonoperating costs:			
Storm damage	$700		
Interest paid	200	900	575
Net profit for January (to Schedule A)			$ 8,530

The Statement of Cost of Finished Goods Manufactured, Exhibit 69, is prepared to show the cost of *completed production* for the period. The direct material cost, direct labor cost, and applied factory overhead cost constitute the total costs charged to production during the period. Since $1,384 was *overapplied* to production because of the use of incorrect overhead rates, this amount is subtracted from the total costs charged to work in process in order to obtain the correct *normal* costs charged to produc-

Exhibit 68

Leonard Cabinet Manufacturing Co.

Schedule B-1

Statement of Cost of Goods Sold

Jan. 1. to Jan. 31, 19—

Inventory, finished goods, Jan. 1, 19—		$ 2,000
Add: Normal cost of finished goods manufactured (B-2)		26,754
Total cost of goods available for sale		$28,754
Less: Inventory, finished goods, Jan. 31, 19—	$9,000	
Less: Factory overhead variance adjustment for incorrect overhead rates	415	
Adjusted inventory, finished goods, Jan. 31		8,585
Total normal cost of goods sold (to Schedule B)		$20,169

tion during the period. The beginning inventory of work in process is included in the cost of completed production. The ending inventory of work in process is adjusted for $138, the variance due to the use of incorrect rates identified with production remaining in process, and the adjusted amount is subtracted from the total normal production costs to obtain the normal cost of finished goods manufactured.

Exhibit 69

Leonard Cabinet Manufacturing Co.

Schedule B-2

Statement of Cost of Finished Goods Manufactured

Jan. 1 to Jan. 31, 19__

Direct material cost		$12,000
Direct labor cost		10,000
Factory overhead cost applied to production		8,000
Total costs charged to work in process		$30,000
Adjustment for factory overhead variance due to incorrect overhead rates (B-3)		1,384
Total normal costs charged to work in process		$28,616
Add: Work in process inventory, Jan. 1, 19__		1,000
		$29,616
Less: Work in process inventory, Jan. 31, 19__	$3,000	
Less: Adjustment for factory overhead variance due to incorrect overhead rates (B-3)	138	
Adjusted work in process inventory, Jan. 31, 19__		2,862
Total normal cost of finished goods manufactured (to Schedule B-1)		$26,754

The normal cost of finished goods manufactured is entered in the Statement of Cost of Goods Sold as an addition to the beginning inventory of finished goods to obtain the total cost of goods available for sale. The ending inventory of finished goods is adjusted for $415, the amount of the variance due to the use of incorrect overhead rates identified with production for the period remaining in finished goods inventory. The adjusted finished goods inventory is subtracted from the total amount available for sale to determine the total normal cost of goods sold, which includes the factory overhead variance of $831 representing the variance resulting from the use of incorrect overhead rates identified with the cost of goods sold.

Closing the Books. When cost systems are in use, it is advantageous to close the books and to prepare financial and cost statements at the end of each month. When a system of job order cost accounting is employed, the process of transferring cost items to the summary account, Profit and Loss, differs from the method identified with financial accounting. At regular intervals during the month or quarter the Materials in Process, Labor in Process, and Factory Overhead in Process accounts are credited, and the Finished Goods account is debited for the cost of goods finished and transferred to finished stock. The charges to the

EXHIBIT 70

LEONARD CABINET MANUFACTURING COMPANY

STATEMENT OF ACTUAL AND APPLIED FACTORY OVERHEAD COSTS AND VARIANCES

Schedule B-3

Jan. 1 to Jan. 31, 19__

	Dept. A	Dept. B	Dept. C	Dept. 1	Dept. 2	Dept. 3	Dept. 4	Total
Actual factory overhead costs:								
Variable costs:								
Indirect materials	$ 50.00	$ 30.00	$ 20.00	$ 100.00	$ 50.00	$ 30.00	$ 120.00	$ 400.00
Indirect labor	300.00	200.00	100.00	600.00	200.00	200.00	175.00	1,775.00
Payroll taxes	15.00	10.00	5.00	372.50	107.50	120.00	95.00	725.00
Repairs				80.00				80.00
Power and light	3.00	2.00	5.00	110.00	30.00	35.00	15.00	200.00
Heat	10.00	7.50	12.50	100.00	50.00	45.00	25.00	250.00
Total variable costs	$378.00	$249.50	$142.50	$1,362.50	$ 437.50	$ 430.00	$ 430.00	$3,430.00
Fixed costs:								
Rent	20.00	15.00	25.00	200.00	100.00	90.00	50.00	500.00
Taxes	15.00	15.00	15.00	150.00	45.00	36.00	24.00	300.00
Depreciation of machinery	100.00	160.00	240.00	600.00	400.00	200.00	300.00	2,000.00
Insurance	2.00	2.00	2.00	20.00	6.00	4.80	3.20	40.00
Total fixed costs	$137.00	$192.00	$282.00	$ 970.00	$ 551.00	$ 330.80	$ 377.20	$2,840.00
Total direct charges	$515.00	$441.50	$424.50	$2,332.50	$ 988.50	$ 760.80	$ 807.20	$6,270.00
Apportioned service department costs:								
Dept. A	$515.00	$ 10.30	$ 5.15	$ 257.50	$ 77.25	$ 113.30	$ 51.50	
Dept. B		$451.80	$ 24.35	194.30	97.10	87.50	48.55	
Dept. C			$454.00	113.50	113.50	113.50	113.50	
Total apportioned charges				$ 565.30	$ 287.85	$ 314.30	$ 213.55	
Total actual factory overhead costs				$2,897.80	$1,276.35	$1,075.10	$1,020.75	$6,270.00
Factory overhead cost applied to production				1,987.80	2,217.00	1,704.45	2,090.75	8,000.00
Total factory overhead variance				$ 910.00*	$ 940.65	$ 629.35	$1,070.00	$1,730.00
Factory overhead variances deferred because of seasonal conditions				182.00*	188.13	125.87	214.00	346.00
Factory overhead variances due to incorrect overhead rates				$ 728.00*	$ 752.52	$ 503.48	$ 856.00	$1,384.00†

* Debit.

† Variance distributed as follows:

Work in process inventory	$ 138.00
Finished goods	415.00
Cost of goods sold	831.00
Total	$1,384.00

Finished Goods account consist of actual cost of direct materials consumed, actual cost of direct labor used in production, and estimated amount of factory overhead which has been applied to production orders by means of predetermined departmental overhead rates. Likewise when goods are sold, the cost, as recorded in the Finished Goods account in total and in the subsidiary finished goods stock ledger in detail, is debited to the Cost of Goods Sold account and credited to the Finished Goods account. Thus, at the end of the period, the Cost of Goods Sold account summarizes all production costs which are chargeable to sales for the period. The balance of this account represents the total normal cost of goods sold shown in the Statement of Cost of Goods Sold.

As previously explained, the Cost of Goods Sold account may contain an incorrect amount of applied factory overhead and a correcting entry may be necessary before it is transferred to the Profit and Loss account. The amount of the correcting entry is determined when, as a function of the closing process at the end of each period, the actual factory overhead costs are classified by service and production departments, the service department costs are subsequently transferred to production departments, and the actual factory overhead allotted to each production department is compared with the amount of overhead that was applied to production orders during the period. The variance between the actual and the applied factory overhead for each production department is analyzed, and the amount attributable to an incorrect overhead rate and applicable to goods sold during the period should be transferred from the variance accounts to the Cost of Goods Sold account as an adjusting debit or credit.

The Profit and Loss account for the period contains the cost of goods sold representing factory operations, the total selling costs applicable to the period, the total administration costs for the period, the net sales, and various nonoperating income and expense items. The Profit and Loss account contains summary figures because the cost analysis and summarization have taken place in part during the period and in part at the end of the period, as a function of the closing process, but before the final summarization of cost elements is made in the Profit and Loss account.

The monthly profit and loss statement and the balance sheet can be prepared directly from the general ledger accounts after the monthly adjusting entries have been made or from the adjusted trial balance. The profit and loss statement is a condensed statement containing controlling or summary accounts for each major cost such as cost of goods sold, selling costs, and administrative costs. Monthly statements of inventories may be prepared from an analysis of inventory records. The raw materials and supplies inventories are obtained by summarizing the quantities and costs shown in the Balance sections of the ledger accounts in the stock ledger. A physical inventory should be made frequently to prove the accuracy of the stock ledger records. The work in process inventory value is obtained by summarizing the direct material costs, the direct labor costs, and the applied overhead recorded on production orders for work remaining in process in an incompleted state. A physical inventory of the work in process should be made monthly to check the correctness of the production orders. The finished goods inventory is computed by summarizing the quantities and costs of goods recorded in the stock ledger accounts in the finished goods ledger.

Other forms of monthly statements such as manufacturing costs, cost of goods sold, service departments' costs, production departments' costs, analysis of overhead variances, and spoiled and defective work cannot be prepared from the general ledger or the trial balance. Their preparation necessitates the analysis of various subsidiary records such as the standing orders, payroll summaries, materials consumed summaries, and spoiled and defective work reports before the necessary cost data can be obtained.

Closing journal entries are illustrated as follows for the Leonard Cabinet Manufacturing Co., Schedules B and B-1, Exhibits 67 and 68:

Sales	$38,124	
Cost of Goods Sold		$20,169
Selling Cost Control		6,000
Administrative Cost Control		4,000
Profit and Loss		7,955
Interest and Dividends	$ 1,475	
Storm Damage		$ 700
Interest Paid		200
Profit and Loss		575
Profit and Loss	$ 8,530	
Earned Surplus		$ 8,530

SPECIAL PROBLEMS

Special problems in connection with the operation of a job order cost accounting system include adjustment of inventories; accounting for idle time, overtime, bonuses, defective and spoiled work; and capitalization of installation costs.

Adjustment of Inventories. At least once each year a physical inventory of materials, of work in process, and of finished goods should be taken. Inventory reports of the number of units of each class of raw material and of semifinished and finished products are prepared for each stockroom and production department. The raw material and finished stock inventory reports are compared with the book inventory as shown in the balance section of each raw material and finished stock account in the raw stock and finished goods ledgers. The work in process inventory is verified by comparing production orders representing goods in process with the work remaining in process.

Differences in quantities between the physical and book inventories frequently occur, owing to such causes as miscount of units received and issued, shrinkage, theft, and misplacement. The amount of the shortage and the underlying causes should be determined and the book inventories corrected accordingly. Normal conditions of production are accompanied by shortages such as shrinkage, issue of larger quantities than requisitioned, and theft of small quantities. Journal entries required to adjust the differences between physical inventories and balances, as shown by perpetual inventory records, adjudged to be normal conditions of manufacturing operations are as follows:

Adjustment of raw materials inventory—physical inventory less than stock records:

Entry in general ledger:

Factory Overhead Control	xxx	
Materials Control (or Inventory Adjustment)		xxx

Entry in subsidiary records:

Number of units and cost are recorded in the issued section of the appropriate stock ledger accounts in the stock ledger; entry in the standing order for inventory adjustment, charging the proper service department responsible for the stockroom control.

Adjustment of work in process inventory—physical inventory less than quantitie shown in production orders in process:

Entry in general ledger:

Factory Overhead Control	xxx	
Materials in Process		xxx
Labor in Process		xxx
Factory Overhead in Process		xxx

Entry in subsidiary records:

Number of units and cost are recorded as adjustments in the appropriate production orders in materials, labor, and applied factory overhead sections; entry in the standing order for inventory adjustment, charging the proper production department.

Adjustment of finished goods inventory—physical less than book inventory:

Entry in general ledger:

Factory Overhead Control	xxx	
Finished Goods		xxx

Entry in subsidiary records:

Number of units and cost are recorded in the issued section of the appropriate finished goods ledger accounts; entry in the standing order for inventory adjustment, charging the finished goods stockrooms responsible for the shortage.

Occasionally a physical inventory discloses the fact that there are more units on hand than are shown by the book records. In such cases the entries given above are reversed, the additional quantities and costs are added to stock records or production orders, and the standing order for inventory adjustment is credited, the proper departments being identified. Since such an overbalance is rare, the standing order for inventory adjustment generally does not contain a separate column for credits. Credit adjustments can be noted at either the top or bottom of the form.

Shortages, disclosed by a physical count, which can be attributed to be spread over all production orders processed during the accounting period by means of the predetermined overhead rate or rates that apply overhead costs to jobs on the basis of direct labor hours, machine-hours, or direct labor costs identified with each production order. This plan is consistent with the policy of spreading labor costs, which may be considered irregular or the result of special administrative policies, to all work processed during the accounting period by treating such special labor charges as overhead costs.

DEFECTIVE WORK REPORT No.________

Production order No.________ No. of units________ Date________

Department responsible for spoilage________ Nature of defects________

____

Department	Description of additional work required	Material cost	Labor		Applied factory overhead	Total cost
			Hours	Cost		

Inspected by________ Supervised by________

Exhibit 71.

Accounting for Defective Work. Inspectors scrutinize work in process at the completion of each stage of production in order to separate defective and spoiled products from those which equal the standard of perfection required of all finished production. Defective work is to be distinguished from spoiled work. The former is work in which there is some imperfection which can be brought up to standard by additional materials and labor, while the latter cannot be reconditioned and the units must be sold either as scrap or as second- or third-grade products.

When it is necessary to recondition work which is labeled by inspectors as defective, a defective work report, Exhibit 71, may be prepared and attached to the production order representing the defective work. The defective work report contains the number of the production order, a description of the nature of the defective work, the number of units involved, and the additional cost of material, labor, and applied factory overhead necessary to bring the products up to standard. The entries required to remedy the defective work are as follows:

Entry in general ledger:

Materials in Process	xxx	
Labor in Process	xxx	
Factory Overhead in Process	xxx	
Materials Control		xxx
Payroll Control		xxx
Applied Factory Overhead (by departments)		xxx

Entry in subsidiary records:

The additional cost of the material, labor, and applied factory overhead is added to the defective work report which is attached to production order; entry for material cost in issued section of stock ledger accounts; entry in time tickets for labor cost; entry in the applied factory overhead analysis sheet for the amount of overhead applied to the defective work.

The method explained is used successfully in concerns where production in process occasionally has to be reconditioned and where the work involved is of some magnitude. In enterprises where small amounts of material and labor are required on many orders to bring them up to standard, it may not be practical to prepare a defective work report for each order. The additional cost may be considered as a general factory overhead cost instead of an additional charge to work in process. If this method of accounting is adopted, the following entries are necessary:

Entry in general ledger:

Factory Overhead Control	xxx	
Materials Control		xxx
Payroll Control		xxx
Applied Factory Overhead (by departments)		xxx

Entry in subsidiary records:

The cost of material, labor, and applied factory overhead is entered in a standing order for defective work where a charge is made to the production department responsible for the additional cost; the entries for material, labor, and applied factory overhead are identical with those given for the preceding entry.

Accounting for Spoiled Work. The cost of production, recorded in production orders as jobs are processed in each department, should include all costs which are normal and necessary in manufacturing operations. When a normal amount of spoiled work is included in costs as a regular operating condition, the number of units completed are divided into the total cost of the order, each unit completed bearing an equal share of the spoiled work. If this method of treating spoiled work is followed, no special accounting treatment is necessary other than the removal of the scrap value of the material from production. The scrap value may be charged to Materials Control and credited to Materials in Process, subsidiary entries being made in the stock ledger accounts and in production orders.

A special accounting treatment is required when spoiled work is of some magnitude and is in excess of the normal amount. Spoiled work may show a marked increase when production is of an experimental nature, or it may result from the employment of untrained labor during labor difficulties or from gross carelessness in the use of materials, labor, and machines. Losses due to spoiled work are production costs in such cases, but the losses should be borne by the department or factory as a whole rather than by adding the burden to the individual production orders which happen to be in production at the time. The loss should be removed from work in process and added to the Factory Overhead Control account which, indirectly, is apportioned to all production orders during the period.

Frequently some part of the spoiled work may be salvaged and sold either as scrap materials or as seconds. The accounting entries required when spoiled work is deemed to be a general overhead cost are based upon a spoiled work report (see Exhibit 72).

Entry in general ledger:

Materials Control (Scrap Value)	xxx	
Factory Overhead Control	xxx	
Materials in Process		xxx
Labor in Process		xxx
Factory Overhead in Process		xxx

Entry in subsidiary records:

The quantity and value of scrap or products having a sale value are entered in the received section of the stock ledger accounts for scrap or spoiled work; the total value of material, labor, and applied overhead lost due to spoiled work is entered as a charge against the appropriate production departments in the standing order for spoiled work; the production order is marked "spoiled" and is filed as evidence of inefficient production.

Capitalization of Installation Costs. A problem which frequently arises in connection with the purchase of machinery and equipment is the proper handling and disposition of installation costs. If agencies outside the business enterprise are employed to install machinery and equipment, a voucher is prepared and charged to the Machinery and Equipment account for the total cost of services rendered. The installation cost is a legitimate part of the cost of the asset acquired.

The problem differs to some extent when the enterprise uses its own materials and employees in the installation, since the question then arises as to whether or not the concern should be permitted to add to the cost of the machinery and equipment the cost of material, labor, and factory overhead expended in the installation work. In theory at least all costs incurred, including a reasonable amount of factory overhead, are a legitimate cost. Since there is no profit element involved, such a cost generally is lower than that which would be paid to another company for the installation work.

SPOILED WORK REPORT No.____________

Department No.________ Date____________

Production order No.________ Stock account charged____________

Standing order charged____________

Number of units	Description and condition	Cost of order				Estimated sale value
		Material	Labor	Applied overhead	Total cost	

Returned by____________ Received by____________

Exhibit 72.

One point of view does not favor the addition of any factory overhead to the asset value unless there is an increase in the regular factory overhead costs due to the installation work. The argument is that regular overhead costs are accruing whether or not the installation work is performed by the enterprise and that it is not conservative accounting to permit a fixed asset to absorb a portion of regular overhead costs. A production order generally is used to record material, labor, and factory overhead expended in installation work. The cost of the completed order is the basis for the journal entry to record installation costs performed by the enterprise as follows:

Machinery and Equipment	xxx	
Materials Control		xxx
Payroll Control		xxx
Factory Overhead Control		xxx

The Factory Overhead Control account should be credited only for extra overhead costs charged to that account for the installation work. Standing orders for the overhead costs affected should be adjusted for the extra overhead costs incurred for the installation work.

A less conservative point of view supports the policy that the cost of fixed assets installed or constructed should include a charge for overhead costs applied at the same rate and on the same basis as used for the regular plant production. This plan has ease and consistency in its favor and appears to be logical, because if a concern uses its own workmen, tools, heavy equipment, and supervision to install or construct its fixed assets, some of the overhead costs incurred are applicable to these projects. The following journal entry illustrates the use of this policy:

Machinery and Equipment	xxx	
Materials Control		xxx
Payroll Control		xxx
Applied Factory Overhead (by departments)		xxx

During periods of extensive machinery installation or construction of fixed assets, there may be a correspondingly low production of the company's products. Therefore costs of production may be reduced, including overhead, because part of the plant overhead has been applied to fixed asset accounts. This situation should be properly disclosed in the company's financial statements and reports in order to avoid the presentation of misleading cost of production data during such abnormal periods of plant operation.

WHAT MANAGEMENT MAY EXPECT OF A SYSTEM OF JOB ORDER COST ACCOUNTING

It should be emphasized that cost accounting is a managerial tool, and its value is dependent upon the use made of the statistics that are produced daily, weekly, and monthly by executives responsible for formulating policies and supervising departmental activities. The operation of a complete system of job order cost accounting requires the use of a system of budgetary control for overhead costs, the daily accumulation of material and labor costs identified with each job, the end-of-the-month summarization and accumulation of overhead costs by service and production departments, and the derivation and disposition of variances between actual and applied overhead costs. It is obvious that a great deal of supervisory, accounting, and clerical work is required in order to operate such a plan.

Advantages of Job Order Cost Accounting. The job order cost system can be a very effective managerial tool for the following reasons:

a. The fact that budgeting is a requirement for the preparation of normal overhead rates implies the use of a system of budgetary control for overhead costs and the extension of budgetary procedures to production in the determination of estimates of direct labor hours or machine-hours for departments or production centers. Such systems of budgetary control permit management to anticipate cost and production conditions, to plan operations more effectively, and to indoctrinate supervisors and department heads with cost consciousness.

b. The availability of normal, predetermined overhead rates for each department before the accounting period begins and during such periods makes possible the preparation of estimates of costs of jobs being planned for production or for bids being submitted in anticipation of future contracts.

c. The cost system produces material, labor, and applied overhead costs daily by departments for each job as it progresses through the plant. Thus management has available cost information regarding each order and can determine trends of costs, can compare the operating efficiency of men and machines in each cost center, and can determine the completion cost of each job.

d. Immediately upon the completion of each job, it is possible to determine the total cost of material, labor, and overhead; to estimate the selling and administrative costs identifiable with each order; and, by comparing such costs with the selling price, to ascertain the profit or loss on each order. Thus it may be apparent to management which type of production is the most profitable.

e. Over a period of months and years there is available to management a complete file of production orders which may constitute extremely valuable statistics of cost and production experience for planning future operations. Such statistics make possible comparisons of costs by orders, by departments, by plants, by months and years, and make possible the preparation of graphs, charts, and reports of the cost history of the business enterprise.

f. At the end of each accounting period, the actual overhead costs are analyzed by type of cost and by service and production departments so that a detailed comparison between applied and actual overhead costs can be made. The resulting analysis of variances is invaluable in determining the efficiency of those responsible for departmental operations.

g. Both spoiled and defective work can be identified with particular production orders and subsequently identified with departments and groups of workers so that management may determine daily the responsibility for these forms of inefficiency.

Weaknesses of Job Order Cost Accounting. It should not be presumed from the preceding discussion that job order cost accounting is without imperfections. Its weaknesses may be summarized as follows:

a. In order to operate a job order cost system effectively it is necessary to identify materials, labor operations and overhead costs with jobs and departments. Thus a great deal of clerical work is required daily, with the result that the cost of cost accounting may be too great for many concerns.

b. Although budgetary control is required for the proper determination of predetermined departmental overhead rates, the budgetary control system may be fragmentary and may not extend to such important cost elements as material, labor, selling, and administration.

c. The costs obtained are the actual costs available upon the completion of each order on a daily basis. Such costs are historical and as such cannot be considered as great a value to management as predetermined or estimated costs, which can be made available for material, labor, and overhead before production is undertaken.

d. The costs obtained represent *actual* conditions of operations and leave unanswered the more important question of what costs *should be* under the existing circumstances and operating conditions. Without the establishment of standards of operating efficiency, management is without proper tools for the evaluation of the operating efficiency of men and machines.

CHAPTER XII

PROCESS COST ACCOUNTING

Types of Industry Using Process Costs. Process cost accounting may be used successfully in plants producing standard products which are intermingled in such a manner that lots are not distinguishable. The following conditions are favorable for the use of process cost accounting principles:

a. Production of a single product in a plant.

b. Division of a plant into processes or departments, each responsible for the manufacture of a single product.

c. Processing a single product for a scheduled time, followed by successive runs of other products, each run being separated as to production and costs.

d. Production of several products of standard design in the same plant, process, or department under conditions which permit computation of weighted averages to denote relative importance of each product as to quantities and costs.

e. Division of a factory into separate operation or production centers, each performing standard operations.

If many different commodities are produced in the same process, there is difficulty in allocating costs to each product. Thus, if a single department of a furniture factory produces office furniture, including desks, chairs, and bookcases of varying sizes and designs, an average cost per unit is unsatisfactory, since unlike products are being averaged. Plants fabricating a single product, or so departmentalized that each department produces a single product, are best adapted to the use of the process cost system. Plants producing electric power, paper, rubber products, bread, candy, steel products, medicines, and chemical products can use process cost systems advantageously.

Another type of enterprise to which process cost accounting is well adapted includes concerns such as flour mills, bottling companies, canning plants, bakeries, breweries, and some steel and heavy manufacturing concerns which schedule work so as to produce different products in the same process, each product having a separate run. A canning plant may process one vegetable continuously for several days or weeks, other vegetables being processed at allotted times. A bottling company may schedule the processing of a certain formula for a day, preparing a different drink each successive day of a week. When the same machine and equipment are used for processing different products successively, it is necessary to keep a record of production and of costs for each scheduled run. Material and labor can be computed for each run, but overhead must be allocated by equitable distribution bases, the time element in terms of hours of operation being a primary consideration.

In a few industries, such as foundries, machine shops, mattress factories, and laundries, it is possible to fabricate several unlike products simultaneously in the same process or department and to obtain reasonably accurate costs through the use of weighted averages. The success of this mode of costing depends upon the accuracy with which weights, denoting the relative importance regarding cost conditions, can be assigned to each product. The fewer the number of products flowing through a process, the more successfully the cost plan can be operated.

Another group of concerns is typified by the refining of oil, processing of by-products in packing plants, and the manufacture in mass-production plants of parts for automobiles, typewriters, electrical equipment, and products mechanical in nature. A large number of operations are needed to produce a single part or product, and many thousands of like units may flow through a single operation. The operation cost method, which is a refinement of process cost accounting, may be used in plants of this type.

General Principles. Process cost accounting is predicated on the theory that average costs are typical of operating conditions of production and that average costs are of primary interest to management. The general principles of process cost accounting may be outlined as follows:

a. Costs, both direct and indirect, are accumulated in cost accounts during the period and are reclassified by departments or processes at the end of the period.

b. Production in terms of quantities such as units, tons, pounds, feet, and gallons are recorded by processes daily or weekly and are summarized in departmental reports at the end of the period.

c. The total cost of each process is divided by the total production for the process to obtain an average cost per unit for the period.

d. When products remain in process at the end of a period, production and inventories are computed in terms of completed products, the stage of completion usually being estimated and the identity of each lot being ignored.

e. If units are lost or spoiled in a department, the loss is borne by the units completed and remaining within the department, thus increasing the average cost per unit.

f. In cases where products are processed in more than one department, costs of one department are transferred to the next department, the total cost and unit cost of products being accumulated when completed.

Departmentalization. The proper classification of production activities of a factory by departments or processes is one of the most important steps in the operation of a process cost system. The factory may be divided into processes which include relatively large spheres of activity, or into operations or "cost centers" which are limited to a single operation or type of work. The process or department usually includes a number of operations, none of which is separately measurable and each of which completes a distinct stage in the manufacture of the product. The boundaries of the process are determined by (*a*) jurisdiction or supervision, (*b*) similarity of work performed, and (*c*) physical location of men and machines in the plant.

A supervisor or foreman is given jurisdiction over a process, which may be a battery of machines, a group of workmen performing similar operations, or a combination of men and machines responsible for the completion of a distinct stage in the production of the product. While not essential, proper supervision and production record keeping are facilitated by the physical grouping of men and machines constituting a process. The terms "process" and "department" are used interchangeably in later discussions of process cost accounting.

Accounting for Materials. The material accounting procedure during each accounting period involves the use of the general accounting system with its regular accounting ledgers and records of original entry. Materials and supplies are vouchered from such supporting business papers as purchase orders, invoices, and receiving reports, and the amount of the purchase is entered in the voucher register or purchase journal as a debit to a Materials Control account. It is customary to have a subsidiary stock ledger in support of the Materials Control account, and each purchase is recorded in accounts in the stock ledger while the physical materials are placed under the control of stockkeepers.

Materials and supplies are issued from stockrooms upon written requisitions prepared by supervisors in charge of processes. The requisitions are prepared in duplicate; the original is kept by the stockkeeper, and the second copy is filed in the process receiving the material. At the end of each accounting period requisitions are sorted by processes, and the quantities issued from stockrooms can be checked with quantities received by processes. A summary report of quantities and value of material issued to processes during the period provides the basis for a general journal entry debiting each process account and crediting the Materials Control account.

Accounting for Labor and Supervision. In accounting for labor the important consideration is the identification of each worker with the processes benefiting from his labor. Daily time reports are prepared to show all employees engaged in production in each process; transfer forms are used to record hours of work for workers who divide their time among processes. At the end of each accounting period daily time reports are summarized in a report of labor costs for each process, which is used as a basis for the journal entry debiting each process and crediting the factory Payroll Control account. The Payroll Control account is debited in the voucher register when payroll vouchers are prepared.

Accounting for Overhead Costs. In addition to materials and payrolls, there are a number of other costs, termed "overhead costs," which must be distributed to process accounts in order to obtain the total costs of operating each process during the period.

Costs such as rent, telephone and telegraph, water, gas, power and light, and repairs are vouchered during the accounting period and are entered in the voucher register or cash disbursement journal as a charge to the general ledger controlling account, Factory Overhead Control.

Cost items such as depreciation on buildings and equipment, taxes, and insurance, are set up at the end of the period through the media of adjusting entries.

A few of the factory overhead costs can be apportioned directly to process accounts at the end of the accounting period, but in most cases distribution bases must be selected so as to make possible an equitable allocation. While existing conditions of operation within a factory will prevent the use of arbitrary bases, such allocation bases as those listed in Exhibit 60, page 196, for job order costs can be used for process costs in distributing overhead costs to processes.

After the proper bases of distribution have been determined and the amount of each cost to be allocated to each process has been computed, an entry is made debiting each process and crediting the controlling account, Factory Overhead Control, or each account if separate cost accounts appear in the general ledger.

Detailed Unit Costs Essential to Management. Average costs per unit may be determined very simply by dividing the total monthly costs for a factory by the number of units produced during the period, but management is not supplied with detailed costs to aid in planning and controlling production. The average cost per unit would not be sufficiently complete information unless it was supplemented by detailed costs per unit for each item of cost for each process. The process cost system for a particular company is usually simpler than the job order method because the detailed records of each production order are eliminated. One general proposition applicable to all types of process systems is the determination of the average cost per unit. The fundamental concept of process cost accounting may be stated in the following formula, in which the numerator represents the production cost of materials, labor, and overhead for each process and the denominator represents production in terms of a common unit of measurement for each process:

$$\frac{\left\{\begin{array}{r}\text{Total cost of material, labor, and factory overhead}\\ \text{for each process for the accounting period}\end{array}\right\}}{\left\{\begin{array}{r}\text{Total production in common unit}\qquad\qquad\qquad\\ \text{for each process for accounting period}\end{array}\right\}} = \left\{\begin{array}{l}\text{average unit}\\ \text{cost for each}\\ \text{process}\end{array}\right\}$$

The denominator of the formula is obtained from production records. During the accounting period, daily production records are prepared for each process. Meter readings may be used in some processes to account for production, the meters on machines being read at the beginning and end of each day or run. In plants using piece-rate wage systems, finished units are counted by timekeepers or inspectors. Daily reports of production for each process are summarized to constitute a monthly or end-of-the-period production report.

Accounting for process costs involves two main steps—the accounting for costs, the numerator in the formula, and accounting for production, the denominator of the formula. The average unit cost is used to account for the total process costs by pricing the production completed and any production remaining in process at the end of the accounting period. Specific accounting methods depend upon the type of production in each concern, but the following plans are representative of the various manufacturing operations:

a. Single product, single process.
b. Single product, multiple processes.
c. Multiple products, single or multiple processes.

The various phases of process cost accounting are illustrated by a series of analysis sheets designed to present the use of the process cost formula. The first section of each analysis sheet, representing the numerator of the formula, is a record of the total costs of production as well as the cost per unit. The second section, dealing with the denominator of the formula, is a record of units of production. The third section is concerned with both costs and production; the costs of material, labor, and factory overhead are apportioned to units completed and units remaining in each process at the end of the accounting period.

SINGLE PRODUCT, SINGLE PROCESS

Enterprises producing a single product in a single process, such as simple molding, parts stamping, and simple assemblies, may summarize their costs in an analysis sheet presented as Exhibit 73.

The value of materials issued to the process during the period, obtained from totaling the material requisitions, and the labor costs for the process,

EXHIBIT 73

PROCESS COST ANALYSIS FOR A SINGLE PRODUCT COMPLETED IN A SINGLE PROCESS

January, 19__

	Cost put into process	Cost per unit
A. Costs of production:		
Materials	$25,000.00	$0.50
Labor	12,500.00	0.25
Factory overhead	22,500.00	0.45
Total cost put into process	$60,000.00	$1.20
B. Units of production:		
Received in process	50,000.00	
Completed and transferred to finished goods	50,000.00	
Production divisor in terms of completed units	50,000.00	
C. Costs of production apportioned to units of production:		
Completed and transferred to finished goods, 50,000 units @ $1.20	$60,000.00	

taken from the payroll sheets, are recorded on the analysis sheet. Costs such as rent, telephone and telegraph, water, gas, power and light, repairs, depreciation, taxes, insurance, and fuel, shown in detail in the standing orders and in total in the Factory Overhead Control account, are entered as a total in the analysis sheet. Section A of the analysis presents the total costs of materials, labor, and factory overhead put into process during the period.

It is assumed that all work in process is completed by the end of the accounting period. The units completed and transferred to finished goods, recorded in section B of the analysis, are the same as the number received or started in process. The costs shown in section A are divided by the number of units of production listed in section B to obtain the cost per unit, which is used in pricing inventories and cost of goods sold.

The total costs put into process (section A of the sheet) is accounted for in section C of the analysis sheet. Since there is no work in process inventory, the cost of units completed is the same as the total cost put into process (*total units completed multiplied by total cost of each unit.*) The total cost of completed production is transferred to finished goods inventory.

The summary of costs listed on the sheet provides the basis for the following summary general journal entries recorded at the end of the period:

(1)

Process Control	$60,000	
Materials Control		$25,000
Payroll Control		12,500
Factory Overhead Control		22,500

To summarize production costs for the month.

(2)

Finished Goods	$60,000	
Process Control		$60,000

To transfer the costs of production to Finished Goods.

The Process Control account is a controlling account in the general ledger which summarizes the cost of materials, labor, and factory overhead put into process during the period. If there are several processes or operations, a Process Control account is used for each process or operation.

SINGLE PRODUCT, MULTIPLE PROCESSES

Industrial concerns manufacturing a single product in more than one process may summarize their costs in an analysis sheet illustrated as Exhibit 74. Refining, milling, and the chemical industry are typical of the many firms producing a single product where the flow of production of the article is routed through two or more processes. Costs incurred in the individual processes are accounted for in the same manner as for

EXHIBIT 74

PROCESS COST ANALYSIS FOR A SINGLE PRODUCT COMPLETED IN TWO PROCESSES

January, 19__

	Process 1		Process 2		Totals	
	Cost put into process	Cost per unit	Cost put into process	Cost per unit	Cost put into all processes	Accumulated cost per unit
A. Costs of production:						
Cost from previous processes			$60,000.00	$1.20		
Cost added in present process:						
Materials	$25,000.00	$0.50	—0—	—0—	$25,000.00	$0.50
Labor	12,500.00	0.25	7,500.00	0.15	20,000.00	0.40
Factory overhead	22,500.00	0.45	12,500.00	0.25	35,000.00	0.70
Total cost put into each process	$60,000.00	$1.20	$20,000.00	$0.40		
Accumulated costs	$60,000.00	$1.20	$80,000.00	$1.60	$80,000.00	$1.60
B. Units of production:						
Received in process	50,000		50,000			
Completed and transferred	50,000		50,000		50,000	
Production divisor in terms of completed units	50,000		50,000			
C. Costs of production apportioned to units of production:						
Materials, labor, and factory overhead	(50,000 @ $1.20)	$60,000.00	(50,000 @ $1.60)	$80,000.00	(50,000 @ $1.60)	$80,000.00

concerns with a single process. The analysis is expanded to show the total number of processes and the cost transferred from one process to another until production is completed. Material requisitions and payroll sheets furnish the cost of material and labor incurred in each process. Factory overhead costs are apportioned to each process by equitable distribution bases.

The total costs of each process, which include material, labor, and distributed amounts of factory overhead, are divided by the production of each process obtained from production reports. The labor and factory overhead are termed the "conversion costs," which, together with material costs, form the total cost of the product finished in one process and transferred to the next process. The costs are accumulated from process to process, both as to total costs and as to costs per unit, until the final transfer is made crediting the last process and debiting the Finished Goods account. Finished Goods generally is a controlling account with a supporting subsidiary ledger in which are recorded both quantities and costs of finished stock received from production, sold, and on hand.

In Exhibit 74, it is assumed that all production moves through Process 1 and then is transferred to Process 2, where only labor and factory overhead are added to complete the commodity. Production is so scheduled that no work is left in process at the end of the accounting period. The total cost of $60,000, put into Process 1, is transferred to Process 2, where it is added to the $20,000 representing the total labor and factory overhead put into that process. Similarly the total unit cost of $0.40 computed in Process 2 is added to the unit cost of $1.20 determined in Process 1 to obtain $1.60, the cost of manufacturing each finished article. The accumulated cost of $80,000 is transferred from Process 2 to Finished Goods.

The summary general journal entries recorded at the end of the period from the analysis sheet are as follows:

(1)

Process 1 Control	$60,000	
Process 2 Control	20,000	
Materials Control		$25,000
Payroll Control		20,000
Factory Overhead Control		35,000

To summarize production costs incurred in processes for the month.

(2)

Process 2 Control	$60,000	
Process 1 Control		$60,000

To transfer the cost of Process 1 to Process 2.

(3)

Finished Goods	$80,000	
Process 2 Control		$80,000

To transfer the total cost of production to Finished Goods.

A separate controlling account in the general ledger summarizing the cost of materials, labor, and factory overhead put into process during the period is established for each process. If the processes are too numerous to warrant a separate control account in the general ledger, it may be practical to carry a single general ledger control account supported by subsidiary records detailing the cost of the individual processes.

Work in Process Inventories. A disadvantage generally attributed to process cost accounting is that difficulties arise when goods remain in process uncompleted at the end of the accounting period. The problem of computing inventories in process is of minor importance in many enterprises. Since costs are computed monthly or even less frequently, production schedules are arranged so that no additional materials are put in process the last few hours of the accounting period and all work in process is completed. If production involves too long a period of time to prevent completing all work in process, instructions are given to finish the work in each process so that units not completed will be between processes or completed in processes rather than partially completed.

Since some industries are faced with the problem of computing the value of uncompleted work in process, it is necessary to explain various complications which may arise. Production reports are a record of the total number of units received or made up in the process, the number of units completed and transferred to the next process or to finished goods, and the number of units remaining within the process. The units in process are inspected and an estimate is made of the stage of completion either on a proportional basis, such as one-half, one-third, or three-fourths, or on a percentage basis. In the estimation of the stage of completion, errors occur which form the basis for a criticism of process cost accounting. A mistaken estimate affects the inventory valuation on the balance sheet as well as the cost of goods sold in the profit and loss statement.

Material Added at Various Stages of Production. In many factories where ingredients are mixed according to formula, all the material is added at the beginning of a process. A similar condition exists when units are the result of assembly of fabricated parts in the early stages of a process, subsequent operations involving only labor and machinery. In a few concerns where machine operations are paramount, labor is added at the beginning of a process, and the processing is completed without the aid of labor.

The production divisor in terms of completed units is computed by adding to the number of units completed the proportion or percentage of total number of units remaining in the process at the close of the period. The computation of the value of work in process and of finished units is given in Exhibit 75, which shows materials being added to production at different stages in Process 1 and Process 2.

In the example the material cost of $22,500 is divided by 50,000 (40,000 units finished + 10,000 units in process with all material added

EXHIBIT 75

PROCESS COST ANALYSIS WHEN MATERIAL IS ADDED AT DIFFERENT STAGES OF PRODUCTION

January, 19__

	Process 1		Process 2		Totals	
	Cost put into process	Cost per unit	Cost put into process	Cost per unit	Cost put into all processes	Accumulated cost per unit
A. Costs of production:						
Cost from previous processes			$34,000.00	$0.85		
Cost added in present process:						
Materials	$22,500.00	$0.45	$22,475.00	$0.62	$44,975.00	$1.07
Labor	11,250.00	0.25	15,225.00	0.42	26,475.00	0.67
Factory overhead	6,750.00	0.15	14,500.00	0.40	21,250.00	0.55
Total cost put into each process	$40,500.00	$0.85	$52,200.00	$1.44	$92,700.00	$2.29
Accumulated costs	$40,500.00	$0.85	$86,200.00	$2.29	$92,700.00	$2.29
B. Units of production:						
Received in process	50,000		40,000			
Completed and transferred	40,000		35,000		35,000	
Remaining in process	10,000		5,000		15,000	
Stage of completion:						
Material		100 %		25 %		
Labor and factory overhead		50 %		25 %		
Total units accounted for	50,000		40,000		50,000	
	Material	Labor and factory overhead	Material, labor and factory overhead			
Production divisor in terms of completed units:						
Completed and transferred	40,000	40,000	35,000			
Remaining in process	10,000	5,000	1,250			
Total	50,000	45,000	36,250			
C. Costs of production apportioned to units of production:						
Completed and transferred	(40,000 @ $0.85)	$34,000.00	(35,000 @ $2.29)	$80,150.00	$80,150.00	
Remaining in process:						
Cost from previous processes		$ —0—	(5,000 @ $0.85)	$ 4,250.00		
Cost added in present process						
Materials	(10,000 @ $0.45)	4,500.00	(1,250 @ $0.62)	775.00		
Labor	(5,000 @ 0.25)	1,250.00	(1,250 @ 0.42)	525.00		
Factory overhead	(5,000 @ 0.15)	750.00	(1,250 @ 0.40)	500.00		
Total work in process		$ 6,500.00		$ 6,050.00	12,550.00	
Total costs accounted for		$40,500.00		$86,200.00	$92,700.00	

at the beginning of the process). Labor of $11,250 and factory overhead of $6,750 are each divided by 45,000 units (40,000 completed + 10,000 one-half completed).

The total cost charged to process is accounted for in the computation of the cost of units completed and transferred to Process 2 and of the units remaining in Process 1, as explained in Part C of the analysis sheet.

Of the 40,000 units received in Process 2, 35,000 units were completed and 5,000 units remained one-fourth completed, considered to be 1,250 units in terms of completed products. Since materials, labor, and overhead were incurred at the same rate, the costs for Process 2 are divided by 36,250 (35,000 completed + 5,000 one-fourth completed) to derive the unit costs.

The 35,000 units transferred through both processes is multiplied by the accumulated unit cost of $2.29 to obtain the amount of $80,150 taken to Finished Goods. The 5,000 units remaining in Process 2 are valued at their cost when transferred from Process 1 plus the cost added in Process 2. The cost of the completed units plus the value of the units remaining in Process 2 accounts for the accumulated costs through Process 2.

The total work in process inventory is the sum of the cost of the units remaining in Process 1 and Process 2. The total value of the work in process inventory plus the cost of the units completed and transferred to Finished Goods represents the total production costs charged to all processes during the period.

The general journal entries recorded at the end of the period are summarized from the analysis sheet as follows:

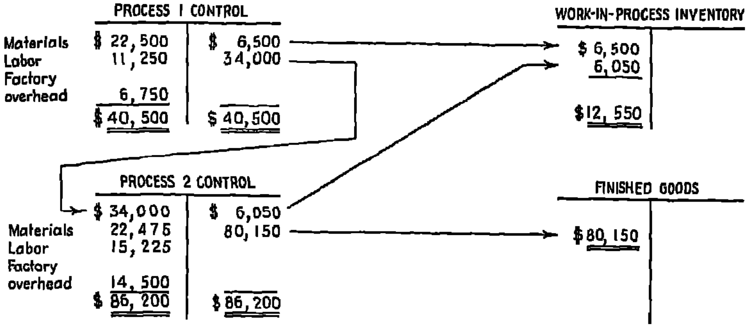
(1)		
Process 1 Control	$40,500	
Process 2 Control	52,200	
Materials Control		$44,975
Payroll Control		26,475
Factory Overhead Control		21,250
To summarize production costs incurred in all processes for the month.		
(2)		
Process 2 Control	$34,000	
Process 1 Control		$34,000
To transfer the cost of completed units from Process 1 to Process 2.		
(3)		
Finished Goods	$80,150	
Process 2 Control		$80,150
To transfer the accumulated cost of completed units from Process 2 to Finished Goods.		

Exhibit 76, chart of process cost control accounts, shows the flow of costs from process to inventory accounts.

The inventories of work in process can be treated in the accounting records in either of two ways. One method does not require a journal entry. The inventory computed for each process is placed on the credit side of the process account and, after the account has been ruled, is brought down on the debit side of the account as the beginning balance for the next period. The balances of process accounts are totaled to constitute the total work in process inventory, which is treated as a current asset on the balance sheet.

Exhibit 76

Chart of Process Cost Control Accounts



The other method involves a journal entry transferring total costs of all inventories in process to a single general ledger account as follows:

Work in Process Inventory	$12,550	
Process 1 Control		$6,500
Process 2 Control		6,050

To transfer the balances of the process control accounts to the Work in Process Inventory account.

The Work in Process Inventory account is shown as a current asset on the balance sheet, and at the beginning of the next period the entry is reversed and each process account is debited for the inventory value which constitutes its beginning inventory.

Material and Labor Added at End of Processes. A common occurrence in processes in factories is the addition of material and/or labor at the end of a process. The addition of material late in a process is illustrated by the filling and sealing of cans in canning factories. Likewise, labor is frequently added in the form of final inspection, labeling, or boxing at the end of the processes. When materials are added at the end of a process, the material costs are divided by the number of units completed. Units in process are not considered in computing unit costs for material, because no material has been added in the process to the units remaining.

If in Exhibit 75, page 235, the labor had been added in Process 2 at the point of completion of the work in that process, the goods remaining in process at the end of the period would have no direct labor applied to them. The cost of labor per unit would be computed by dividing the labor cost of $15,225 by 35,000, the number of units completed during the period, and the resulting unit cost would be $0.435. If it is assumed that material and factory overhead is added as production progresses, the unit cost of these two factors would be determined in the same manner as in Exhibit 75. The inventory value of units remaining in Process 2 would be computed as follows:

Cost from previous processes (5,000 units @ $0.85)	$4,250
Cost added in current process:	
Materials (5,000 units × 25% @ $0.62)	775
No labor added	0
Factory overhead (5,000 units × 25% @ $0.40)	500
Total	$5,525

With labor added at the end of Process 2 the accumulated unit cost is $2.305, resulting in a cost of $80,675 for the 35,000 units completed and transferred to Finished Goods. This amount added to the value of the work in process inventory accounts for the total cost of $86,200 accumulated at the end of Process 2.

Inventories at Various Stages of Completion in a Single Process. In order to obtain more accurate unit costs and inventory values, production may be divided into batches and a stage of completion may be assigned to a certain quantity of production instead of estimating the inventory in a process as being one-third or one-half completed. For example, if there are 1,000 units comprising the Process 1 inventory, 600 units may be estimated to be one-half finished and 400 units one-fourth completed.

In computing the production divisor in terms of completed units, the same methods are followed as were explained in the preceding sections. If total costs for the month for Process 1 are $12,750, units completed are 2,000, and units in process at the end of the period are 300, composed of 200 units one-half finished and 100 units one-fourth completed, the cost per unit is computed by dividing $12,750 by 2,125 units (2,000 completed + 200 units one-half completed + 100 units one-fourth completed).

COMPUTATION OF UNIT COSTS WITH BEGINNING AND ENDING INVENTORIES

When there are inventories of units in process at the beginning and end of a period, the stage of completion of both inventories must be considered in the computation of unit costs, the value of units transferred, and the value of the units on hand. Costs must be equitably prorated over the entire production of the process.

Average Method. Since process cost accounting is predicated on the theory that average costs are typical of operating conditions of production and that average costs are of primary interest to management, a procedure may be used that will average beginning work in process inventory values with the costs of the following accounting period.

The ending work in process inventories shown in Exhibit 75, page 235,

EXHIBIT 77

PROCESS COST ANALYSIS WITH BEGINNING AND ENDING INVENTORIES—AVERAGE METHOD

February, 19—

	Process 1			
	Work in process Feb. 1	Cost put into process	Total cost in process	Cost per unit
A. Costs of production:				
Cost added in present process:				
Materials	$4,500.00	$18,400.00	$22,900.00	$0.458
Labor	1,250.00	9,180.00	10,430.00	0.298
Factory overhead	750.00	6,180.00	6,930.00	0.198
Total cost put into process	$6,500.00	$33,760.00	$40,260.00	$0.954
B. Units of production:				
Received in process	10,000	40,000	50,000	
Completed and transferred			30,000	
Remaining in process, Feb. 28			20,000	
Stage of completion:				
Material				100%
Labor and factory overhead				25%
Total units accounted for			50,000	
	Material	Labor and factory overhead		
Production divisor in terms of completed units:				
Completed and transferred	30,000	30,000		
Remaining in process	20,000	5,000		
Total	50,000	35,000		
C. Costs of production apportioned to units of production:				
Completed and transferred		(30,000 @ $0.954)	$28,620.00	
Remaining in process:				
Cost added in present process:				
Materials		(20,000 @ $0.458)	$ 9,160.00	
Labor		(5,000 @ 0.298)	1,490.00	
Factory overhead		(5,000 @ 0.198)	990.00	
Total work in process			$11,640.00	
Total costs accounted for			$40,260.00	

become the beginning work in process inventories in Exhibit 77, page 239, which presents the analysis of costs for the following month, using an average method of computing unit costs. This procedure involves adding the costs in the beginning work in process inventory to the cost put into process during the current period and dividing this total by a *production divisor in terms of completed units* determined by adding the

The cost added in each process during the current period must be prorated to the production necessary to complete the units in process at the beginning of the period, to complete the units started and finished during the period, and to partially complete the units remaining in process at the end of the period. The costs added in each process during the current period are divided by a production-divisor in terms of completed units determined as follows:

Number of units completed and transferred
less
Per cent of completion of units in process at the beginning of the period
plus
Per cent of completion of units remaining in process at the end of the period

In the illustrated analysis sheet the $18,400 of materials added at the beginning of the process is divided by 40,000 units (30,000 completed and transferred, less 10,000 units 100 per cent completed in process on Feb. 1, plus 20,000 units 100 per cent completed in process on Feb. 28) to determine the cost of $0.46 per unit. The 30,000 completed units less 50 per cent of 10,000 units in process on Feb. 1, plus 25 per cent of 20,000 units remaining in process on Feb. 28, provides the 30,000 production divisor in terms of completed units used to compute the cost per unit of labor and factory overhead.

Since the objective of the first-in, first-out method is to value the inventory at current costs, the unit costs just computed are the basis for valuing the units remaining in process at the end of February. The amount of the ending work in process inventory subtracted from the total cost charged to production, including the beginning inventory, is the amount transferred to Finished Goods. This figure includes the $6,500 inventory Feb. 1, plus the cost to complete these 10,000 units during the month and the cost of completing the 20,000 units started and completed during the month at the current cost. The total cost of $28,500 transferred to finished goods is comprised of 10,000 units representing both January and February costs and 20,000 units representing only February costs. Two entries would be necessary in the finished goods stock ledger: one for 10,000 units at an average cost of $0.906 per unit and the second for 20,000 units at an average cost of $0.972 per unit.

If there are two or more processes, the same procedure is followed in succeeding processes. The first-in, first-out method is followed, and a unit cost is computed for each lot when such units are transferred to Finished Goods.

The monthly summary entries in the general journal are identical except for the amounts, with those illustrating the average method on page 240.

Comparison of Average and First-in, First-out Methods. The effect of using the two methods of handling beginning and ending inventories is reflected by a comparison of the cost of units completed and transferred and the cost of units remaining in process determined by each of the methods in Exhibits 77 and 78:

Method	Cost of completed units transferred to finished goods during February	Cost of units remaining in process Feb. 28
Average..................	$28,620	$11,640
First-in, first-out..........	28,500	11,760

As was explained in Chap. IV in the discussion of the valuation of materials, when prices are rising the first-in, first-out method shows a lower cost of units completed and a higher inventory value because of the fact that current costs are applied to inventory by the use of the first-in, first-out method. During periods of declining prices, lower profits would be reported when the first-in, first-out method is employed because the older or higher costs would be applied to the units completed and sold. The average method when used during periods of rapidly increasing or decreasing costs tends to narrow the extreme prices; the trend upward or downward is more gradual as contrasted with a stair-step type of increase or decline when inventory costs are determined by the first-in, first-out method.

Spoiled Work and Units Lost—Normal Conditions. Whether manufacturing processes are bench or machine operations, there will always be some units lost, spoiled, and defective. The usual procedure followed in process cost accounting does not provide separate accounting for normally spoiled and defective work; the costs assigned to each process are divided by a production divisor in terms of completed products after eliminating units lost, spoiled, and defective. Thus units in process and completed have to bear the loss as an added element of cost.

The normal cost of spoiled and lost units is absorbed as an additional cost of units in process as illustrated in Exhibit 79.

In Process 1, 5,000 were lost, which is considered a normal condition of production; therefore the remaining units completed must bear an additional cost per unit. The unit cost is determined by dividing the cost put into process by a production divisor in terms of completed units that excludes the number of lost units. Since materials were added at the beginning of the process, the cost of $90,000 is divided by 45,000 units (30,000 completed plus 15,000 remaining in process). The costs of labor and factory overhead are divided by 35,000 (30,000 completed plus 15,000 units one-third completed).

The 6,500 units lost, owing to normal shrinkage, in Process 2 involves an additional computation to adjust the unit cost for production lost.

EXHIBIT 79

PROCESS COST ANALYSIS WITH SPOILED WORK AND UNITS LOST—NORMAL CONDITIONS

January, 19__

	Process 1		Process 2		Totals	
	Cost put into process	Cost per unit	Cost put into process	Cost per unit	Cost put into all processes	Accumulated cost per unit
A. Costs of production:						
Cost from previous processes			$141,000.00	$ 4.70		
Cost added in process:						
Materials	$ 90,000.00	$2.00	$ 17,400.00	$ 0.80	$107,400.00	$ 2.80
Labor	52,500.00	1.50	69,600.00	3.20	122,100.00	4.70
Factory overhead	42,000.00	1.20	43,500.00	2.00	85,500.00	3.20
Total cost put into each process	$184,500.00	$4.70	$130,500.00	$ 6.00	$315,000.00	$10.70
Unit cost adjustment for lost units*	—0—	—0—	—0—	1.30	—0—	1.30
Accumulated costs	$184,500.00	$4.70	$271,500.00	$12.00	$315,000.00	$12.00
B. Units of production:						
Received in process	50,000		30,000			
Completed and transferred	30,000		20,000		20,000	
Remaining in process	15,000		3,500		18,500	
Stage of completion:						
Material		100 %		50 %		
Labor and factory overhead		33⅓ %		50 %		
Lost in process (normal condition)	5,000		6,500		11,500	
Total units accounted for	50,000		30,000		50,000	
	Materials	Labor and factory overhead	Materials, labor, and factory overhead			
Production divisor in terms of completed units:						
Completed and transferred	30,000	30,000	20,000			
Remaining in process	15,000	5,000	1,750			
Total	45,000	35,000	21,750			
C. Costs of production apportioned to units of production:						
Completed and transferred	(30,000 @ $4.70)	$141,000.00	(20,000 @ $12.00)	$240,000.00	$240,000.00	
Remaining in process:						
Costs from previous process			(3,500 @ $ 4.70)	$ 16,450.00		
Adjustment for lost units			(3,500 @ 1.30)	4,550.00		
Cost added in present process:						
Materials	(15,000 @ $2.00)	$ 30,000.00	(1,750 @ $ 0.80)	1,400.00		
Labor	(5,000 @ 1.50)	7,500.00	(1,750 @ 3.20)	5,600.00		
Factory overhead	(5,000 @ 1.20)	6,000.00	(1,750 @ 2.00)	3,500.00		
Total work in process		$ 43,500.00		$ 31,500.00	75,000.00	
Total costs accounted for		$184,500.00		$271,500.00	$315,000.00	

$$^{*}\ \frac{\$4.70 \times 6{,}500 \text{ units lost}}{(30{,}000 - 6{,}500) \text{ or } (20{,}000 + 3{,}500)} = \$1.30$$

After the cost per unit for materials, labor, and factory overhead has been computed by a production divisor in terms of completed units of 21,750, which excludes the units lost, the *unit cost adjustment* for *lost* units is computed as follows:

$$\frac{\text{Units lost} \times \text{cost per unit from previous processes}}{\text{Total units received from previous processes} - \text{units lost}}$$

Thus 6,500 units lost multiplied by $4.70 cost per unit from Process 1 divided by 23,500 units (30,000 received minus 6,500 lost) gives $1.30 unit cost adjustment for lost units. No adjustment is made in the total accumulated cost, but the $1.30 must be included in the accumulated cost per unit, because the 23,500 units that are available for completion must share a pro rata amount of the $4.70 cost of each of the 6,500 units completed in Process 1 but lost in Process 2.

The same result is obtained by dividing the cost of $141,000, transferred from Process 1 to Process 2, by 23,500 (20,000 units completed plus 3,500 units in process); the quotient, $6.00, is the same result as adding $1.30 to $4.70. This $6.00 when added to the $6.00 cost per unit put into Process 2 provides the $12.00 accumulated cost per unit.

Thus as a normal condition, if units are lost or spoiled in a beginning process, the production in terms of completed units is divided into the total cost of the process, the loss being absorbed by units finished and in process. The same procedure is followed in subsequent processes, but in addition, the accumulated value of units transferred and lost in a process must be absorbed by units finished and unfinished in the process responsible for the loss. In Exhibit 79 units completed and in process are considered alike, and each unit is allotted an equal share of the loss due to shrinkage. Since units in process will not be completed until the next period, there is a possibility that they may be required to share a loss due to shrinkage for the next accounting period.

Spoiled Work and Units Lost—Abnormal Conditions. In analyzing the daily records of units lost, spoiled, and defective, if it is discovered that a portion of the total is due to abnormal conditions resulting from gross negligence of management or of labor, from sabotage, or from casualty losses, the units in question must be considered in determining the production divisor in terms of completed units so that the amount of the loss may be removed from the cost of production. A decision must be made as to the point in the production process at which the units were lost. The decision as to whether the units were lost at the beginning, the end, or during the process will affect the unit costs for the process.

To illustrate the handling of lost units considered to be abnormal, assume that management is expected to keep losses within 14 per cent of the number of units received in process and that any loss in excess of this amount is considered to be an abnormal condition. In Process 2, Exhibit 79, 2,300 of the 6,500 units lost are considered to be the result of an abnormal condition while 4,200 units are normal spoilage. Assume that all units lost were one-half through the process. The production divisor in terms of completed units in Process 2 is computed as follows:

Units completed and transferred	20,000
Units remaining in process (3,500 × 50%)	1,750
Units lost due to abnormal condition (2,300 × 50%)	1,150
	22,900

Since in Process 2, materials, labor and factory overhead were absorbed by production in the same ratio, the total cost of $130,500 added in Process 2 is divided by 22,900 to obtain a unit cost of $5.6987. The adjustment of the unit cost for the normal spoilage of 4,200 units is computed as follows:

$$\frac{\left\{\begin{array}{l}\$4.70 \text{ (cost per unit from Process 1)}\\ \qquad\qquad\times\, 4{,}200 \text{ units (normal spoilage)}\end{array}\right\}}{\left\{\begin{array}{l}20{,}000 \text{ units completed} + 3{,}500 \text{ remaining}\\ \qquad\qquad\text{in Process } 2 + 2{,}300 \text{ units abnormally lost}\end{array}\right\}} = \$0.7651$$

The accumulated cost per unit is:

Unit cost from Process 1	$ 4.70
Unit cost added in Process 2	5.6987
Unit cost adjustment for normal spoilage	0.7651
Total	$11.1638

The amount of the loss due to abnormal conditions is transferred from the process by the following journal entry:

Abnormal Loss	$19,123.25	
Process 2 Control		$19,123.25
To record the transfer of abnormal loss determined as follows:		
2,300 units × $4.70 from Process 1	$10,810.00	
2,300 units × 0.7651 adjustment for normal spoilage	1,759.75	
2,300 units × 50% × $5.6987 unit cost Process 2	6,553.50	
Total	$19,123.25	

The special loss account should be closed directly to Profit and Loss so that inventories will not be improperly inflated.

The total accumulated cost is $252,376.75 ($271,500.00 − $19,123.25) and is accounted for as follows:

Completed and transferred, 20,000 @ $11.1638		$223,276.00
Remaining in Process 2:		
Cost from previous processes, 3,500 @ $4.70	$16,450.00	
Adjustment for normal spoilage, 3,500 @ $0.7651	2,677.85	
Cost added in present process, 3,500 × 50% @ $5.6987	9,972.90*	29,100.75
		$252,376.75

Salvage Value of Units Lost Due to either Normal or Abnormal Conditions. A daily and monthly summary of units lost, spoiled, and defective should be prepared for each process. Scrap or residue values

*Adjusted to account for fractional cents.

for materials reclaimed from spoiled and defective work should be credited to the process concerned and charged to Materials Control or to a special scrap account. The following entry is recorded in the journal:

Materials Control..................................xxx
  Process 1 Control.......................................xxx
    (Or other processes concerned)

A scrap account in the subsidiary stock ledger is used to record scrap values transferred to the custody of the stockkeeper.

Idle Time. An important defect justly attributed to process cost accounting is the fact the management is not informed from the accounting records of the number of hours and the cost of idle time which may exist in various processes. Since the labor cost is summarized for each process at the end of the accounting period and is divided by the total production to obtain an average unit cost, no recognition is given to the idle time element. It is correct to include normal idle time as a cost element under the general plan of process cost accounting, because the goal is to obtain actual costs, and some waste and inefficiency in the use of labor always exist.

Abnormal idle time is typical of inefficiencies from which a cost accounting system should protect management. The best safeguard is the use of piece-rates within each process. Since it is impossible to apply piece-rates to all classes of employees, the timekeeper or supervisor in each process should be instructed to keep a daily time report of hours and minutes of idle time for each employee. Either a separate idle-time report can be prepared, or the regular daily time reports can be arranged to show the amount of idle time in a separate column. At the end of the accounting period, when payroll records are being analyzed for distribution to processes, labor costs deemed to be the result of abnormal idle time should be recorded as follows:

Idle Time...xxx
  Payroll Control...xxx

The special Idle Time account is closed directly to Profit and Loss. The loss becomes apparent to management, and cost of goods sold and inventories are not inflated with a loss element which is not a true operating cost.

MULTIPLE PRODUCTS, SINGLE OR MULTIPLE PROCESSES

When two or more products or styles or blends of the same product are manufactured at the same time in a single process or multiple processes, costs may be determined by *successive runs* or by proportioning costs through the use of a *weighted average* procedure that employs a common costing unit expressed in terms of points.

Detailed Costs by Successive "Runs." A variation in the computation of detailed unit costs is existent in small plants and in processes in large factories which are subject to production of different products at scheduled periods of time, each product having a separate "run." The same labor personnel, machinery, and equipment are used for each run but, unless costs are computed separately for each product, no satisfactory units costs are available.

Concerns typifying this method of production are canning factories, flour mills, bottling works, bakeries, and chemical laboratories. Thus vegetable canning factories process asparagus, peas, beans, spinach, beets, tomatoes, and corn as each vegetable is in season. While each vegetable is prepared in a different manner, the general processing and equipment are the same. Each run has a definite schedule of hours or days, with an interval of time between the processing of each vegetable for cleaning equipment and preparing for the next run.

Exhibit 80

Full-pack Canning Factory

Analysis of Cost of Production for Successive Runs

June 1 to July 1, 19__

Production costs	Asparagus		Peas		Beans		Spinach		Total costs
	Cost	Cost per unit	Cost	Cost per unit	Cost	Cost per unit	Cost	Cost per unit	
Materials:									
Vegetables	$ 750.00	$0.05	$1,200.00	$0.03	$ 400.00	$0.02	$1,500.00	$0.03	$ 3,850.00
Cans and lids	325.50	0.0217	868.00	0.0217	434.00	0.0217	1,085.00	0.0217	2,712.50
Labels	13.50	0.0009	28.00	0.0007	14.00	0.0007	40.00	0.0008	95.50
Boxes	45.00	0.003	100.00	0.0025	50.00	0.0025	125.00	0.0025	320.00
Miscellaneous supplies	60.00	0.004	120.00	0.003	40.00	0.002	100.00	0.002	320.00
Total material costs	$1,194.00	$0.0796	$2,316.00	$0.0579	$ 938.00	$0.0469	$2,850.00	$0.057	$ 7,298.00
Labor:									
Direct labor payroll	$ 450.00	$0.03	$ 800.00	$0.02	$ 300.00	$0.015	$1,500.00	$0.03	$ 3,050.00
Supervision payrolls	150.00	0.01	200.00	0.005	100.00	0.005	500.00	0.01	950.00
Total payroll costs	$ 600.00	$0.04	$1,000.00	$0.025	$ 400.00	$0.02	$2,000.00	$0.04	$ 4,000.00
Factory overhead costs	300.00	0.02	600.00	0.015	400.00	0.02	500.00	0.01	1,800.00
Total costs	$2,094.00	$0.1396	$3,916.00	$0.0979	$1,738.00	$0.0869	$5,350.00	$0.107	$13,098.00
Total production, No. 2 cans	15,000		40,000		20,000		50,000		125,000

The general ledger journal entries are the same in this type of processing as in the procedure explained for a factory or process producing a single product in a continuous manner. Material, labor, and factory overhead are charged to each process at the end of each accounting period. The difference lies in the use of subsidiary records. A separate analysis sheet is prepared for each run to show the material, labor, and overhead costs which can be definitely identified with the vegetable being processed. Likewise the number of hours that the equipment is used for each vegetable and the total production of cans are carefully recorded. At the end of each accounting period labor costs and factory overhead costs which cannot be identified with a separate run are allotted to the production of each vegetable, usually on a single distribution base; the choice is among the total number of production hours for each vegetable, the total number of cans of each vegetable produced, and the number of pounds of each vegetable packed.

The monthly report, Exhibit 80, exhibits an analysis of costs for vegetables canned for a monthly accounting period. Since No. 2 cans were the only size used, unit costs were computed on the basis of the number of cans produced. If vegetables had been packed in several different sized cans, the unit cost determination could have been made on the basis of the number of pounds packed.

Since generally the costs are summarized in general ledger control accounts at the end of each run, there is no work in process inventory. A finished stock account for each product may be charged for the costs of the completed runs by a journal entry as follows:

Asparagus, Finished Stock	$2,094	
Peas, Finished Stock	3,916	
Beans, Finished Stock	1,738	
Spinach, Finished Stock	5,350	
Materials Control		$7,298
Payroll Control		4,000
Factory Overhead Control		1,800

If there are too many products to warrant a separate general ledger account for each product, a single Finished Stock Control account may be employed with an individual subsidiary stock ledger sheet for each product.

Processing of Two or More Products Simultaneously—Weighted Average-cost Method. When two or more dissimilar products are manufactured in the same process, an average cost per unit obtained by dividing the total process costs by the number of units produced gives a cost figure which is not typical and, in some cases, entirely misleading.

Since an average cost without regard to size and grade is unsatisfactory cost information, the company has several alternatives in planning production and in determining costs. It may be advisable to use production orders under the job order type of cost system rather than attempting to compute costs by the process system. If the process cost system is used, production may be planned on a special-run basis, as has already been illustrated in the case of the Full-pack Canning Factory. If it is desirable to process two sizes and three grades simultaneously, another alternative would be to separate each process into operations, since the majority of operations would be uniform for each product but some models would require different or additional operations. The operation cost plan is explained in the next chapter.

Another alternative which employs the use of a simple statistical device has been found successful in some concerns. Before the accounting period begins, a study is made of production and costs of each type or style of product, and the relative importance of one as compared to others is indicated in terms of points which are used as a common denominator. The rating as to importance may differ from one process to another, or it may remain the same throughout the entire manufacturing process.

The method of computing costs by using a different evaluation of the relative importance of each product in each process is illustrated in the following problem and its solution.

Illustrative Problem

The Dextrose Candy Bar Co. produces three kinds of candy bars which may be designated as A, B, and C. The company keeps its books on the process accounting basis. There are three distinct processes: kitchen, coating, and wrapping. The following table indicates the relative importance of each bar in each process:

Type	Kitchen, points	Coating, points	Wrapping, points
A	4	2	2
B	5	1	2
C	10	3	3

Costs for each department for January are as follows:

	Kitchen	Coating	Wrapping	Total
Material	$3,060	$1,990	$ 296	$ 5,346
Labor	1,020	660	600	2,280
Factory overhead	2,040	1,326	600	3,966
Total	$6,120	$3,976	$1,496	$11,592

Production:

Type	Bars
A	100,000
B	120,000
C	80,000

a. Prepare a statement showing the weighted average production for candy bars for each process.

b. Submit cost statement showing costs for each type of candy bar.

c. Prepare summary journal entries for costs put into each process and transferred.

Solution

a.

DEXTROSE CANDY BAR CO.
STATEMENT OF WEIGHTED AVERAGE PRODUCTION
Jan. 1 to Jan. 31, 19__

Product	Production	Weighted production (points)			Total
		Kitchen	Coating	Wrapping	
A	100,000	400,000	200,000	200,000	800,000
B	120,000	600,000	120,000	240,000	960,000
C	80,000	800,000	240,000	240,000	1,280,000
Totals	300,000	1,800,000	560,000	680,000	3,040,000

b.

DEXTROSE CANDY BAR CO.
COST STATEMENT FOR CANDY BARS
Jan. 1 to Jan. 31, 19__

	Processes			Total	Production	Total cost
	Kitchen	Coating	Wrapping			
(1) Total cost in each process	$6,120.00	$3,976.00	$1,496.00			$11,592.00
(2) Total points in each process	1,800,000	560,000	680,000			
(3) Cost per point (line 1 ÷ line 2)	$0.0034	$0.0071	$0.0022			
(4) Weighted average for candy bar A	4	2	2			
(5) Cost for candy bar A (line 3 × line 4)	$0.0136	$0.0142	$0.0044	$0.0322	100,000	$ 3,220.00
(6) Weighted average for candy bar B	5	1	2			
(7) Cost for candy bar B (line 3 × line 6)	$0.017	$0.0071	$0.0044	$0.0285	120,000	3,420.00
(8) Weighted average candy bar C	10	3	3			
(9) Cost for candy bar C (line 3 × line 8)	$0.034	$0.0213	$0.0066	$0.0619	80,000	4,952.00
Total costs accounted for						$11,592.00

c. Journal entries.

Kitchen Process Control	$6,120	
Coating Process Control	3,976	
Wrapping Process Control	1,496	
Materials Control		$5,346
Payroll Control		2,280
Factory Overhead Control		3,966

To record the cost of materials, labor, and overhead put into each process during January.

Coating Process Control	$6,120	
Kitchen Process Control		$6,120

To record the total cost of all candy bars transferred from the Kitchen to the Coating process.

Wrapping Process Control	$10,096	
Coating Process Control		$10,096

To transfer the total accumulated cost of all candy bars from the Coating to the Wrapping process.

Candy Bar A, Finished goods	$3,220	
Candy Bar B, Finished Goods	3,420	
Candy Bar C, Finished Goods	4,952	
Wrapping Process Control		$11,592

To transfer the total cost of completed candy bars to finished goods.

The success of a system of computing costs by using weighted average production is dependent entirely upon the accuracy with which relative weights or importance are assigned to products. Obviously, if an importance of 2:1 is assigned to product A as compared with product B when the ratio should be 3:1, incorrect cost figures will be obtained. The plan is operated to the best advantage in plants producing a few products simultaneously with simple conditions of production and costs.

CHAPTER XIII

PROCESS COST ACCOUNTING (*Continued*)

Management and accountants agree that the principles underlying process cost accounting are sound and that the general plan of costing is of definite value in the field of cost accounting. Five forms of improvement are being added to process cost accounting so that more complete information is available and managerial control can be exercised over plant operations. The improvements include the use of operations or production centers as cost media instead of larger spheres of activity such as processes or departments; accumulation of costs for service departments as well as operations; the use of detailed subsidiary cost records for materials, labor, factory overhead costs, and production; budgetary control of production and of costs; and normal, predetermined, overhead rates.

It is obvious that, as these additional features are incorporated as a part of an accounting system the cost of cost accounting will increase. The results obtained, however, should lower costs of production and increase efficiency to an extent which should more than compensate for the cost of enlarging and improving the system.

Weaknesses of Processes and Departments as Accounting and Production Divisions. The use of processes or departments implies that the factory is subdivided into a comparatively few large divisions, each under an administrative authority such as a department head or general foreman. A process or department generally includes a number of related operations, which involve the employment of a sizable group of men and machines. A foundry, a machine shop, a power plant, an assembly line, or a gristmill might each constitute a process or a department.

Although a process may be a logical or practical unit of division in a plant from the point of view of supervision of production, it is frequently an unsatisfactory unit for cost accounting purposes. The cost accountant is limited in his computation of cost data to an average cost per unit for each process, which may not enable him to guide management properly in obtaining the most efficient operation of the plant. An average cost for material, labor, and factory overhead which combines conditions of production for machines differing in original cost, size, and power consumption and for labor varying as to skill, efficiency, and wage rates is of problematical value. It is only through a minute classification and a detailed analysis of costs that management can be properly informed as to operating efficiency.

Operations as Accounting and Production Divisions. An operation cost system involves the recording of material, labor, and factory overhead by operations or by production centers through which products pass. The departmental division may be maintained for administrative reasons, but, for purposes of costing, smaller subdivisions are advisable. The type of work performed in each operation or production center should be alike. Machines of the same size performing like operations and labor operations of the same type should be considered as a separate cost center. Although the grouping of similar operations or machines means added convenience for the cost accountant, it is not necessary to rearrange the physical plant. Two groups of machines performing the same operation may be classed as a cost center, even if they are located at opposite ends of a factory building.

The general plan of accounting for operations is similar to that of process cost accounting. It is assumed that all units processed in the same operation are uniform and have the same cost. The cost per unit, an average cost, is obtained at the end of each accounting period by dividing the costs of an operation by the number of units completed in the operation center. Usually material costs are separated from operation costs, which are composed of labor and factory overhead assigned to operation centers. Thus the total cost of a product is ascertained by adding to the material cost the costs of the several operations through which it passes.

The accounting records for operations will differ with types and sizes of business enterprises. If the operations are not too numerous, it may be advantageous to have an account in the general ledger for each operation. It may be more practical to carry a general ledger account for each large process or department, such as the foundry or machine shop, and to have, as a subsidiary record in support of it for each operation center within the process, an analysis sheet which can be used as a costing medium. The general ledger account for the process or department would show total costs, while the analysis sheet for each operation would show detailed costs assigned to the operation and would be used as a basis for computing unit costs.

Service Departments as Intermediate Costing Divisions. Such departments as superintendent's office, payroll, personnel, planning, maintenance, repairs, purchasing, trucking, shipping, and stockrooms are operated for the purpose of facilitating factory operations. The cost of sustaining service departments is an important part of the total factory overhead cost, and the items composing the cost of each department should be available to management so that proper control can be exercised.

An account can be carried in the general ledger for each service department. Each service department would receive entries from the Materials Control, Payroll Control, and Factory Overhead Control accounts as a function of the process of closing the books at the end of each period, distribution bases being used for the apportionment of indirect charges. An analysis sheet can be used as a subsidiary record for each service department to show the detailed costs accumulated for the department. After the cost of maintaining each service department has been obtained, the next step in the closing process is the distribution of service department costs to operations in an equitable manner by means of selected allocation bases.

Budgetary Control. The use of operations as costing units, the accumulation of costs by service departments, and the recording of detailed costs and production in subsidiary records make practical the control of manufacturing activities through the media of cost and production budgets.

Separate budgets can be prepared for material, labor, factory overhead, and production in terms of units. The material budget will exhibit materials and supplies requirements for the budget period for each service department and for each operation. The labor budget will show for the budget period the labor requirements and wages for each class of wage earner for each service department and operation. The factory overhead budget will contain an estimate of each type of cost, such as taxes, rent, depreciation, power, and repairs, which can be classified by service departments and operations. Production budgets will include estimates of the expected production for the period in terms of units, hours of work, and machine operations for each operation. All budgets should be prepared after an exhaustive investigation of past production and of existing cost conditions and after attempting a forecast of conditions to be in effect during the budget period.

The budget estimates can be incorporated in the subsidiary records for service departments and operations where they are readily available for comparison with actual costs. Subsidiary analysis sheets or standing orders which can be used for both budget estimates and actual costs are described in succeeding sections.

Need for Normal, Predetermined, Overhead Rates in Process Cost Accounting. In the explanation of job order cost accounting the use of normal, predetermined overhead rates was particularly stressed and their incorporation in such cost accounting systems was considered essential for two reasons:

a. Predetermined overhead rates make possible the computation of the total costs for each job immediately after the completion of the job, thereby giving management up-to-date cost information for purposes of control and price determination.

b. Normal overhead rates permit the allocation of a normal amount of overhead based upon a normal operating capacity for a planned number of units to be manufactured, estimated for the entire year or budget period, on the basis of the average or normal cost per unit, per direct labor or machine-hour, or per dollar of labor cost, thereby eliminating seasonal or irregular conditions which may exist in overhead costs and production.

In the discussion thus far of process cost accounting, the treatment of factory overhead costs has been given on an actual cost basis with no consideration being given to the use of predetermined overhead rates.

This treatment has been given partly for simplicity in discussing the various complications that embody process cost accounting, but also because it is a common practice in process plants to determine unit costs monthly or quarterly as a historical form of accounting with material, labor and overhead costs summarized simultaneously for each process or operation at the end of the accounting period. Recently, interest in budgeting and the desirability of having current costs computed on a normal overhead cost basis rather than on an actual cost basis have led to the use of normal predetermined overhead rates in many plants where process or operation cost methods of accounting are employed.

There are three distinct advantages of using normal, predetermined overhead rates in connection with process or operation cost systems. The majority of business enterprises are subject to seasonal conditions of overhead cost and production. In such concerns the allocation each month of that particular month's overhead costs to that period's production may result in the computation of high unit costs in some months but very low unit costs in other months. Since most business men prefer to consider the year's overhead costs and production as a complete cycle of activities, they prefer to view the relationship of overhead costs to production as an average or normal charge per unit, thus neutralizing seasonal or monthly extremes. The use of a normal predetermined overhead rate makes this goal possible.

The use of predetermined overhead rates permits the computation of total costs per unit for each process or operation on a daily, weekly, or monthly basis instead of only at the end of each accounting period when actual overhead costs are accumulated and summarized. Since actual material and labor costs are accumulated weekly, or in a few enterprises at the end of each day, managers of such concerns may find it valuable to apply the predetermined overhead rates for each process or operation to the week's or day's production, thereby exercising more frequent cost comparisons and control.

A third advantage of predetermined overhead rates accrues to management in formulating price policies and preparing estimates or bids for prospective orders. Material and labor cost estimates can be computed with a reasonable degree of accuracy but without the use of predetermined overhead rates, based upon an effective system of budgetary control, the total estimated cost per unit for each process or operation cannot be computed.

Computation of Normal, Predetermined, Overhead Rates in the Process Plant. The principal features of the plan of computing normal overhead rates for the job order cost system can be applied to process cost accounting. A choice can be made between a single overhead rate for the entire plant and a separate overhead rate for each process or operation. Likewise a choice of application bases may be made from the following: units of production, direct labor-hours, machine-hours, and direct labor cost. If a separate overhead rate is computed for each process or operation, it is probable that two or more of these methods will be used in a single factory. The existing conditions of production in each process or operation determine the method to be used, but the two most important considerations are equitableness and practicability. The direct labor hour method and the machine-hour method are considered the most equitable since most overhead costs accrue on the basis of time.

The formulas for the normal predetermined overhead rates for the process plant may be expressed as follows:

$$\frac{\left\{\begin{array}{l}\text{Estimated overhead for Process or}\\ \qquad\text{Operation 1 for budget period}\end{array}\right\}}{\left\{\begin{array}{l}\text{Estimated production in terms of units, pounds,}\\ \text{etc., for Process or Operation 1 for budget period}\end{array}\right\}} = \left\{\begin{array}{l}\text{rate per unit}\\ \text{of production}\end{array}\right\}$$

$$\frac{\left\{\begin{array}{l}\text{Estimated overhead for Process or}\\ \qquad\text{Operation 2 for budget period}\end{array}\right\}}{\left\{\begin{array}{l}\text{Estimated direct labor hours for Process or}\\ \qquad\text{Operation 2 for budget period}\end{array}\right\}} = \left\{\begin{array}{l}\text{rate per direct}\\ \text{labor hour}\end{array}\right\}$$

$$\frac{\left\{\begin{array}{l}\text{Estimated overhead for Process or}\\ \qquad\text{Operation 3 for budget period}\end{array}\right\}}{\left\{\begin{array}{l}\text{Estimated machine-hours for Process or}\\ \qquad\text{Operation 3 for budget period}\end{array}\right\}} = \left\{\begin{array}{l}\text{rate per}\\ \text{machine-hour}\end{array}\right\}$$

The general procedure involved in the preparation of normal predetermined overhead rates for plants which have service departments and processes or operations as cost centers may be summarized as follows:

a. The preparation of factory overhead budgets for each class of costs such as salaries, supplies, rent, depreciation, and power.

b. The allocation of estimated factory overhead costs to service departments and processes or operations.

c. The allocation of the total estimated service departments' costs to processes or operations, thereby classifying all estimated overhead costs by production centers.

d. The preparation of production budgets containing estimates of production for each process or operation in terms of units, direct labor hours, machine-hours, or direct labor costs,

e. *The computation of an equitable overhead rate for each process or operation* to be used during the budget period.

PROCESS COST STATEMENTS

Statements to inform management of the current financial status of the company and of the progress made by and the costs incurred for each operation and division will differ according to the requirements of the individual firm. The balance sheet, profit and loss statement, and cost of goods sold statement for a process plant are similar to those illustrated for job order cost accounting in Chap. XI. The statement of finished goods manufactured may be prepared in a variety of forms for process plants, depending upon whether a company is processing single or multiple products in single or multiple processes. The statement may include a comparison of the cost of materials, labor, and factory overhead by processes and by products and may present increases and decreases in work in process inventories.

EXHIBIT 81

EASI-REST MATTRESS CO.

STATEMENT OF COST OF FINISHED GOODS MANUFACTURED

Jan. 1 to Jan. 31, 19__

Production costs	Sewing room		Blowing		Tufting and finishing		Inspection and wrapping		Total cost	
	Cost	Cost per unit	Cost	Cost per unit	Cost	Cost per unit	Cost	Cost per unit	Cost	Cost per unit
Materials:										
Ticking	$ 750	$0.75							$ 750	$0.75
Cotton			$4,000	$4.00					4,000	4.00
Thread	30	0.03			$ 20	$0.02			50	0.05
Twine					60	0.06			60	0.06
Miscellaneous supplies	5	0.005	10	0.01	15	0.015	$ 20	$0.02	50	0.05
Mattress bags							60	0.06	60	0.06
Total material cost	$ 785	$0.785	$4,010	$4.01	$ 95	$0.095	$ 80	$0.08	$4,970	$4.97
Labor:										
Direct labor payroll	500	0.50	200	0.20	1,000	1.00	150	0.15	1,850	1.85
Clerical payroll	50	0.05	40	0.04	60	0.06	30	0.03	180	0.18
Supervision and executive payroll	100	0.10	80	0.08	150	0.15	70	0.07	400	0.40
Total payroll cost	$ 650	$0.65	$ 320	$0.32	$1,210	$1.21	$250	$0.25	$2,430	$2.43
Factory overhead:										
Rent	50	0.05	40	0.04	100	0.10	10	0.01	200	0.20
Depreciation of equipment	25	0.025	60	0.06	10	0.01	5	0.005	100	0.10
Storage	10	0.01					20	0.02	30	0.03
Power and light	15	0.015	25	0.025	5	0.005	5	0.005	50	0.05
Telephone and telegraph	3	0.003	3	0.003	3	0.003	3	0.003	12	0.012
Insurance	5	0.005	15	0.015	5	0.005	3	0.003	28	0.028
Taxes	5	0.005	10	0.01	3	0.003	2	0.002	20	0.02
Repairs	10	0.01	25	0.025					35	0.035
Miscellaneous factory costs	15	0.015	10	0.01	4	0.004	1	0.001	30	0.03
Total factory overhead costs	$ 138	$0.138	$ 188	$0.188	$ 130	$0.13	$ 49	$0.049	$ 505	$0.505
Total costs	$1,573	$1.573	$4,518	$4.518	$1,435	$1.435	$379	$0.379	$7,905	$7.905
Number of mattresses completed during January—1,000										

Statements of cost of finished goods manufactured for multiple process plants with no work in process inventories, illustrated as Exhibit 81, for the Easi-Rest Mattress Co., can be prepared to show detailed costs and the cost per unit for each process for each day, week, or month.

A Statement of Cost of Finished Goods Manufactured for a multiple process plant, with work in process inventories and normal overhead rates, is presented as Exhibit 82. It is assumed that a portion of the factory overhead variances is due to seasonal conditions and is to be deferred to subsequent months. The remaining balance of the factory overhead variances, resulting from the use of incorrect overhead rates, is adjusted to the costs of production and to work in process inventory.

Exhibit 82

Reliance Manufacturing Co.

Statement of Cost of Finished Goods Manufactured

Jan. 1 to Jan. 31, 19__

	Process 1	Process 2	Total
Direct material cost	$45,000	$20,000	$65,000
Direct labor cost	15,000	7,000	22,000
Factory overhead cost applied to processes	10,300	8,400	18,700
Total costs charged to processes	$70,300	$35,400	$105,700
Adjustment for factory overhead variance due to incorrect overhead rates	1,300*	3,600	2,300
Total normal costs charged to processes	$69,000	$39,000	$108,000
Add: Work in process inventory, Jan. 1, 19__	6,000	2,500	8,500
Total normal production costs	$75,000	$41,500	$116,500
Less: Work in process inventory, Jan. 31, 19__	$18,800	$ 1,500	$ 20,300
Adjustment for incorrect overhead rates	320*	142	178*
Adjusted work in process inventory, Jan. 31, 19__	$18,480	$ 1,642	$ 20,122
Total normal cost of finished goods manufactured	$56,520	$39,858	$ 96,378

* Credit variance.

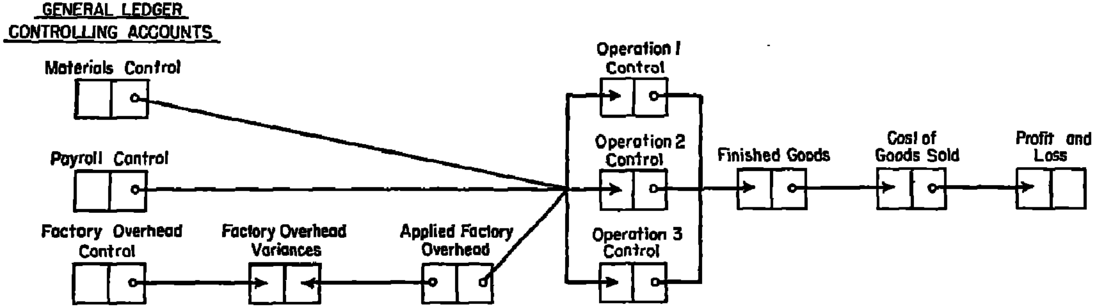
A PLAN OF COSTING WHICH INCLUDES OPERATION COSTS, SERVICE DEPARTMENT COSTS, BUDGETARY CONTROL, AND NORMAL, PREDETERMINED, OVERHEAD RATES

Manufacturing and cost conditions vary to such an extent that special adaptations of accounting technique are required in an individual enterprise, but it is possible to outline a general procedure of cost accounting which uses the general principles underlying budgetary control and process cost accounting with operation centers and service departments as costing units. Exhibit 83 is an accounting plan for such a system.

Accounts and Subsidiary Records. The accounts in the general ledger and the accompanying subsidiary records will vary with the requirements of the individual firm, but for illustrative purposes it is assumed that the general ledger contains a Materials Control account, a Payroll Control account, a Factory Overhead Control account, an Applied Factory Overhead account, a Factory Overhead Variances account, an account for each operation, a Finished Goods account, a Cost of Goods Sold account and a Profit and Loss account.

EXHIBIT 83

CHART OF AN OPERATION COST ACCOUNTING SYSTEM WITH PREDETERMINED OVERHEAD RATES



SUBSIDIARY COST RECORDS

Materials stock ledger
Payrolls and time tickets
Standing orders showing actual and budgeted factory overhead costs by:
  Type of cost
  Service departments
  Operations.

Analysis sheet of overhead variances by operations

Analysis sheet of applied factory overhead by operations

Cost and production sheet for each operation showing units completed, units of inventory, detailed material, labor, and applied overhead costs

Finished stock ledger

FORMULAS FOR OVERHEAD RATES

$$\frac{\text{Estimated overhead—operation 1 for budget period}}{\text{Estimated direct labor hours—operation 1 for budget period}}$$

$$\frac{\text{Estimated overhead—operation 2 for budget period}}{\text{Estimated units—operation 2 for budget period}}$$

$$\frac{\text{Estimated overhead—operation 3 for budget period}}{\text{Estimated machine-hours—operation 3 for budget period}}$$

The Materials Control account controls one or more stock ledgers which show quantities and cost for each class of materials and supplies. The Payroll Control account controls payroll sheets, daily time reports, and piece-rate reports. The Factory Overhead Control account controls a ledger or, more commonly, a group of analysis sheets or standing orders.

The Applied Factory Overhead account is a controlling account which summarizes the factory overhead costs charged to operations by means of the predetermined overhead rates. This account could be supported by an analysis sheet which shows in detail the amount of overhead applied daily, weekly, or monthly to each operation in the plant. The Factory Overhead Variances account is used to record the difference between the actual factory overhead and the applied factory overhead at the end of each accounting period. It may be supported by an analysis sheet explaining in detail the amounts and causes of variances for each operation.

For informational and control purposes, it is advantageous to have a control account in the general ledger to summarize the actual material and labor costs, and the applied factory overhead costs for each operation.

The Finished Goods account, as a controlling account, summarizes entries made in the finished goods subsidiary ledger. The Cost of Goods Sold account, which is closed into the Profit and Loss account at the end of the period, is used to record the cost of goods sold during the period.

Accounting Procedure. As materials and supplies are obtained from stockrooms, the requisitioning department or operation number or symbol is indicated on requisitions. At the end of each day, week, or month, requisitions are sorted by operations to form the basis for the general ledger entry debiting each operation and crediting the Materials Control account. The amount of supplies used by each operation and service department is inserted in the operation and department standing order, and a summary entry is made at the end of the accounting period debiting Factory Overhead Control and crediting the Materials Control account. When payrolls are analyzed, a journal entry is made debiting each operation account and crediting the Payroll Control account for the total amount of direct labor. The amount of the indirect labor is charged to the Factory Overhead Control account and credited to the Payroll Control account, the details being shown in the service department and operation overhead standing orders.

Each day, week, or month, depending upon the plan of accounting followed, the production for each operation is summarized in terms of the application base used, direct labor hours, machine-hours, units, or direct labor cost. The overhead rate for each operation is applied and a journal entry made debiting each operation account and crediting the Applied Factory Overhead account. If the overhead rates are applied to production daily or weekly, the amounts charged to each operation may be recorded on an applied overhead analysis sheet which summarizes the applied overhead by operations as supporting data for the summary journal entry made at the end of each month.

The Factory Overhead Control account in the general ledger controls standing orders for each class of cost such as taxes, rent, depreciation, and repairs. In the voucher register or cash disbursement records, the Factory Overhead Control account is charged for vouchers passed for payment during the period, and the Vouchers Payable account is credited. At the end of the period adjusting entries are made properly to recognize such items as depreciation, taxes accrued, and expired insurance, with the result that the Factory Overhead Control account is charged in total; the detailed charges are made to standing orders, such as taxes, rent, depreciation, and repairs, which constitute a subsidiary record.

After the standing orders subsidiary to the Factory Overhead Control account have been used to classify costs by service departments and operations, the next step in the closing process is the transfer to operation centers of the total cost of maintaining each service department so that the total overhead cost of manufacturing will finally be classified by operations. Theoretically, since some service departments such as the personnel department serve other service departments, service department charges should be transferred to other service departments as an intermediate step in the process of transferring costs to operations. In many enterprises such an elaborate distribution is impractical and service departments' total costs are transferred directly to operations.

Exhibit 63, page 199 will suggest bases for the distribution of both the estimated and actual service departments' costs to other service departments and to operations; the budget estimates are allocated at the beginning of the budget period, and the actual costs are distributed at the end of the period. The standing orders, which constitute the subsidiary record for operations, show the directly charged overhead costs and the apportioned service departments' costs for the period.

There remains the important task of recording, analyzing, and disposing of the variance between actual and applied factory overhead costs. A journal entry may be prepared debiting the Applied Factory Overhead account, crediting the Factory Overhead Control account, and debiting or crediting the difference between the two accounts to the Factory Overhead Variances account. The reasons for the variance may be determined for each operation by a detailed comparison of the actual and budgeted overhead costs and production in terms of units, direct labor hours, machine-hours, or direct labor cost. The disposition of the variance has been explained in connection with job order cost accounting in Chap. X.

Computation of Unit and Total Costs. The total cost of each operation is divided by the total period's production in terms of completed products to obtain the average cost per unit. Since costs and production are accounted for by relatively small spheres of activity, *viz.*, operations, generally there is little difficulty encountered in determining production in terms of completed products. At the end of each accounting period all production within each operation can be completed, so that all inventory of work in process is between operations, having been completed in one operation and fabrication not having started in the succeeding one. To obtain the value of work in process, it is only necessary to add together the separate unit costs of production for operations through which the material has progressed.

Transferring Costs. Since all products processed may not pass through the same operation centers, generally it is not possible to transfer the total cost of each operation to successive operating centers. In fact in some establishments it may not be practical to attempt to transfer any operation costs to other operations. In such cases the total cost of each operation, representing the cost of goods completed in the operating center during the period, is debited directly to Finished Goods, and each operation is credited.

In case it is desirable to transfer costs from one operation center to another on an accumulative basis, the production of a single operation must be accounted for in terms of the number of completed units which are transferred to other departments. The unit cost for the operation is multiplied by the number of units transferred to each successive operation, and an entry is made debiting the operations which receive the goods and crediting the operation transferring the production.

Illustrative Problem and Solution. The procedures explained in the preceding sections are incorporated in the following problem and its solution.

Illustrative Problem

The Independent Packers, Inc., purchases dressed hog carcasses and processes them into pork, ham, bacon, and lard products. The company experiences seasonal conditions of production and overhead costs; therefore the comptroller plans to allocate overhead costs to each pound of completed products by means of a normal, predetermined overhead rate for each operation, based upon budgets of overhead costs and production for each operation for the year. The normal overhead rates are to be applied to production by a charge to the various product accounts at the end of each month on a per pound basis.

A study of the processing discloses the following flow of products through the eight operations:

Operation	Types of Products
1	Pork, ham, bacon, and lard
2	Pork, ham, bacon, and lard
3	Lard
4	Bacon, ham, and pork
5	Bacon and ham
6	Ham
7	Bacon
8	Pork

The budgets for the year show the following estimated overhead costs and estimated production in terms of pounds for each operation:

Operation	Estimated factory overhead costs	Estimated production, lb.
1	$150,000	30,000,000
2	187,500	30,000,000
3	4,700	5,000,000
4	471,500	25,000,000
5	405,000	15,000,000
6	75,000	8,000,000
7	93,800	7,000,000
8	112,500	10,000,000
	$1,500,000	

Production reports show pork products completed during January as follows:

Pork..............	1,000,000 lb.
Ham.............	800,000 lb.
Bacon............	700,000 lb.
Lard..............	500,000 lb.

Cost records show the following data for January:

Operation	Raw product costs—dressed carcasses	Direct labor costs
1	$592,000	$15,000
2		21,000
3		500
4		50,000
5		43,500
6		8,000
7		10,500
8		12,000
	$592,200	$160,500

Actual factory overhead costs total $145,000 for January.

a. Compute the normal predetermined overhead rate for each operation for the year.

b. Prepare a schedule showing total costs and cost per pound for each operation for January.

c. Prepare a statement showing the total costs and cost per pound for each product for January.

d. Prepare journal entries as of Jan. 31 to record the cost of materials and labor charged and the factory overhead applied to each operation, the transfer of costs to operations and to Finished Goods, and the factory overhead variances. Assume that the entries for the purchase of raw products, the vouchering of the payroll, and the recording of actual factory overhead costs have already been made.

Solution

a. Normal predetermined overhead rates by operations:

Operation		Rate per lb.
1	$\dfrac{\$150{,}000}{30{,}000{,}000\text{ lb.}}$	= \$0.005
2	$\dfrac{\$187{,}500}{30{,}000{,}000\text{ lb.}}$	= 0.00625
3	$\dfrac{\$4{,}700}{5{,}000{,}000\text{ lb.}}$	= 0.00094
4	$\dfrac{\$471{,}500}{25{,}000{,}000\text{ lb.}}$	= 0.01886
5	$\dfrac{\$405{,}000}{15{,}000{,}000\text{ lb.}}$	= 0.027
6	$\dfrac{\$75{,}000}{8{,}000{,}000\text{ lb.}}$	= 0.009375
7	$\dfrac{\$93{,}800}{7{,}000{,}000\text{ lb.}}$	= 0.0134
8	$\dfrac{\$112{,}500}{10{,}000{,}000\text{ lb.}}$	= 0.01125

b.

INDEPENDENT PACKERS, INC.
ANALYSIS OF COSTS BY OPERATIONS
Jan. 1 to Jan. 31, 19__

Operations	Production, lb.	Materials		Labor		Applied factory overhead		Total	
		Cost charged to operations	Cost per lb.	Cost charged to operations	Cost per lb.	Cost charged to operations	Cost per lb.	Cost charged to operations	Cost per lb.
1	3,000,000	$592,200	$0.1974	$ 15,000	$0.005	$ 15,000	$0.005000	$ 622,200	$0.207400
2	3,000,000			21,000	0.007	18,750	0.006250	39,750	0.013250
3	500,000			500	0.001	470	0.000940	970	0.001940
4	2,500,000			50,000	0.020	47,150	0.018860	97,150	0.038860
5	1,500,000			43,500	0.029	40,500	0.027000	84,000	0.056000
6	800,000			8,000	0.010	7,500	0.009375	15,500	0.019375
7	700,000			10,500	0.015	9,380	0.013400	19,880	0.028400
8	1,000,000			12,000	0.012	11,250	0.011250	23,250	0.023250
		$592,200		$160,500		$150,000		$902,700	

c.

INDEPENDENT PACKERS, INC.
ANALYSIS OF COSTS BY PRODUCTS
Jan. 1 to Jan. 31, 19__

Operations	Total cost, per lb.	Pork, per lb.	Ham, per lb.	Bacon, per lb.	Lard, per lb.
1	$0.207400	$0.207400	$0.207400	$0.207400	$0.207400
2	0.013250	0.013250	0.013250	0.013250	0.013250
3	0.001940				0.001940
4	0.038860	0.038860	0.038860	0.038860	
5	0.056000		0.056000	0.056000	
6	0.019375		0.019375		
7	0.028400			0.028400	
8	0.023250	0.023250			
Total cost per pound for each product		$0.282760	$0.334885	$0.343910	$0.222590
Total production, lb.		1,000,000	800,000	700,000	500,000
Total cost per product		$282,760	$267,908	$240,737	$111,295

d. Journal entries.

(1)

Operation 1 Control	$592,200	
Raw Products—Dressed Carcasses		$592,200

To charge Operation 1 with the cost of dressed carcasses for January.

(2)

Operation 1 Control	$15,000	
Operation 2 Control	21,000	
Operation 3 Control	500	
Operation 4 Control	50,000	
Operation 5 Control	43,500	
Operation 6 Control	8,000	
Operation 7 Control	10,500	
Operation 8 Control	12,000	
Payroll Control		$160,500

To charge operations for the direct labor cost.

(3)

Operation 1 Control	$15,000	
Operation 2 Control	18,750	
Operation 3 Control	470	
Operation 4 Control	47,150	
Operation 5 Control	40,500	
Operation 6 Control	7,500	
Operation 7 Control	9,380	
Operation 8 Control	11,250	
Applied Factory Overhead		$150,000

To record overhead applied to operations.

(4)

Operation 2 Control	$622,200	
Operation 1 Control		$622,200

To transfer the cost of Operation 1 to Operation 2.

(5)

Operation 3 Control	$110,325	
Operation 4 Control	551,625	
Operation 2 Control		$661,950

To record the transfer of the costs of Operation 2 as follows:

Cost per lb., Operation 1	$0.20740
Cost per lb., Operation 2	0.01325
Accumulated unit cost	$0.22065

To Operation 3: 500,000 lb. @ $0.22065 = $110,325
To Operation 4: 2,500,000 lb. @ $0.22065 = $551,625

(6)

Finished Goods—Lard	$111,295	
Operation 3 Control		$111,295

To transfer the total cost of Operation 3 to finished goods.

(7)

Operation 5 Control	$389,265	
Operation 8 Control	259,510	
Operation 4 Control		$648,775

To transfer the costs charged to Operation 4 as follows:

Cost per lb., Operation 1	$0.20740
Cost per lb., Operation 2	0.01325
Cost per lb., Operation 4	0.03886
Accumulated unit cost	$0.25951

To Operation 5: 1,500,000 lb. @ $0.25951	$389,265
To Operation 8: 1,000,000 lb. @ $0.25951	$259,510

(8)

Operation 6 Control	$252,408	
Operation 7 Control	220,857	
Operation 5 Control		$473,265

To transfer the costs of Operation 5 as follows:

Cost per lb., Operation 1	$0.20740
Cost per lb., Operation 2	0.01325
Cost per lb., Operation 4	0.03886
Cost per lb., Operation 5	0.05600
Accumulated unit cost	$0.31551

To Operation 6:

800,000 lb. @ $0.31551	$252,408
700,000 lb. @ $0.31551	$220,857

(9)

Finished Goods—Ham	$267,908	
Operation 6 Control		$267,908

To transfer the total cost charged to Operation 6 to finished goods.

(10)

Finished Goods—Bacon	$240,737	
Operation 7 Control		$240,737

To transfer the total cost charged to Operation 7 to finished goods.

(11)

Finished Goods—Pork	$282,760	
Operation 8 Control		$282,760

To transfer the total costs charged to Operation 8 to finished goods.

(12)

Applied Factory Overhead	$150,000	
Factory Overhead Variances		$ 5,000
Factory Overhead Control		145,000

To close the actual and applied factory overhead accounts and to set up the total variances for all operations.

If all or a portion of the balance of the Factory Overhead Variances account has resulted from seasonal conditions, a deferred credit may be shown in the balance sheet in anticipation of counteracting conditions of overhead costs and productivity in other months of the year. If all or a portion of the variances are considered to be caused by the use of incorrect overhead rates, a supplementary rate per unit of production may be computed. If some of this period's production has been sold, the variances should be adjusted to finished goods inventory and cost of goods sold either by means of supplementary rates or by the ratio method, which provides for the apportionment of the variances to the period's production remaining in finished goods and representing products sold.

What Management May Expect from a System of Process Cost Accounting. The managerial benefits that may be obtained from a complete system of process costs, which incorporates the use of budgets for overhead costs, maintains service departments and operations as costing units, and employs predetermined application rates, may be summarized as follows:

a. The cost plan produces an average cost per unit of completed products with detailed costs for material, labor, and overhead computed for each process or operation.

b. The unit costs are available at the close of each accounting period, which is generally a month, but in some plants where predetermined overhead rates are employed, unit costs are available at the close of each day or week.

c. The costs of operating the system are much less than is required for the job order cost plan since it is more economical to classify and summarize costs by processes or operations than for each job.

d. Monthly reports make possible valuable comparisons between budgeted and actual costs for each product by processes or operations, thereby permitting the extension of managerial control to include the evaluation of operating efficiency.

Weaknesses of Process Cost Accounting from the Managerial Point of View. Process cost accounting is inadequate as a completely effective managerial tool in the following respects:

a. It produces an average cost per unit for the accounting period, but an average cost figure may be considered unsatisfactory inasmuch as it prevents a detailed analysis and evaluation of the operating efficiency of individual workmen, departments, and operations on a daily basis.

b. Costs are reported on a historical basis, and the reports of operation costs are available to management for a post-mortem examination only, too late to permit the exercise of the most effective managerial control.

c. The attention of management is directed toward actual costs, which may include excessive quantities of materials, spoiled work, ineffective use of labor, and unnecessary overhead costs, rather than what costs *should be*, assuming that the plant has reached a high point of operating efficiency. The incorporation of standard costs is an essential improvement because of the change in the point of view of management that generally results.

CHAPTER XIV

JOINT-PRODUCT COST AND BY-PRODUCT ACCOUNTING

Critics of cost accounting frequently contend that the prevalence of joint costs both in production and selling prevent the accurate computation of unit costs in the majority of business enterprises. It must be admitted that if the sole purpose of cost accounting is to derive strictly accurate unit costs, the existence of joint costs in so many instances of unit cost computation will give a sound basis for the criticism. The derivation of unit costs is not the only function of cost accounting; the importance of cost statistics to management in controlling production and distribution through comparisons of costs and productivity of departments, jobs, workers, territories, and salesmen has been discussed in earlier sections. However, an examination of cost subjects studied does offer many illustrations of the existence of joint cost conditions.

Problems of Joint Costs a General Condition of Business. Problems of joint costs are not peculiar to any single type of industry but are existent in more or less degree in every business enterprise. Conditions of joint costs were discussed in connection with the proper valuation of materials and supplies purchased, received, and placed in stock or in manufacturing operations. Generally, two or more dissimilar products are purchased through the medium of a single purchase order, are included in a single freight shipment, are invoiced, vouchered, and payment is made as a single business transaction. In order to obtain the unit costs for each product, it is necessary to apportion the joint costs of purchasing, receiving, and handling the shipment to the products on the basis of dollars of purchases or weight or volume.

In job order plants, the allocations of overhead costs to service departments and production departments, the reallocation of service department costs to production departments, and the applying of the overhead costs for production departments to production orders by means of overhead application rates were all examples of joint cost distributions. In plants or departments producing two or more products costed by means of the process cost accounting plan, the application of overhead costs to processes and the subsequent division of material, labor, and overhead costs among the several products obtained from the manufacturing process are strictly joint cost allocations.

Likewise, distribution cost accounting, which involves the allocation of selling costs to sales departments, territories, salesmen, lines of products, and sales orders, is primarily concerned with joint costs, their analysis, and application to cost units.

The discussion of joint costs need not be limited to a special chapter, because the problems are daily ones for the cost accountant. However, since some industries encounter the problems of joint costs and by-products to a greater degree than others, some of their special accounting problems will be discussed in the present chapter, but no attempt will be made to delve into the complicated joint cost situations that arise in particular industries. The problems encountered are so complex and so highly technical that their study has become a specialized branch of the general field of cost accounting. The specialized accounting procedures for handling joint costs are best studied in connection with conditions existent in industries such as oil refining, meat and vegetable packing, tobacco manufacturing, railroad operations, and the mining of precious metals, iron ore, and coal. For example, in processing oil, there are obtained such important products as gasoline, fuel oil, lubricating oil, kerosene, paraffin, asphalt, and, more recently, synthetic rubber. Each product has its own price and marketing conditions.

Distinction between Joint-product Costs and By-products. The differentiation between industries producing by-products and those producing joint products is a matter of degree. If a firm is manufacturing or processing two or more commodities from one basic raw material and if one or more of these commodities are considered of less relative importance than the other or others, the firm is said to be producing under by-product conditions, and the commodity or commodities of less relative importance than the other or others are termed "by-products." If, however, the products obtained are of relatively the same value, the firm is said to be operating under joint-product conditions, and the units of production are termed "joint products." It is evident that the difference indicated is of a relative nature and that the accounting techniques employed may well be altered to fit the individual situation.

It is apparent that some of the problems of joint and by-product accounting may be encountered in the ordinary firm in the handling of scrap values. It is important, however, to realize that true scrap values often arise from incomplete or inefficient production but that by-products arise from purposeful and efficient operations. It is relatively easy for a firm to produce both joint products and by-products and to show the difference between these products by their treatment in the accounting system.

ACCOUNTING FOR JOINT-PRODUCT COST

Problems Involved in Accounting for Joint-product Costs. Joint products arise when the processing of one or more basic materials yields a number of finished products, none of which is considered of relatively more importance than the others. In such case, as contrasted with by-products, the emphasis is not placed on any one product; the accounting methods employed attempt to analyze individual product costs by an allocation of the total common costs to the component units of each product derived.

The manufacturer of joint products is faced with the problem of marketing his various products, each of which has its own marketing problems and its own selling price, which are determined by the factors of supply and demand in a competitive market over which the producer seldom has direct control. The manufacturer is interested in obtaining the largest gross profit possible from the sale of each of his products and in increasing the output of the most profitable items, but he will continue to produce and market the other less profitable products since they absorb a share of the joint production costs, thus permitting a greater margin of profit to be made on the more favorable products. As a guide in planning his production and in marketing his joint products, it is necessary that he know as accurately as possible the relative share of the total costs of production that are attributable to each of the joint products.

Regular process cost accounting methods can be used to determine the total material, labor, and overhead costs of production up to the point where one or more products are separated from production and to compute the costs applied to each product from the point of "split-off" to the stage of completion. The principal problem in accounting for joint products is to determine the proportionate share of the total cost of production to the point of split-off that should be borne by the different joint products involved in the conversion process.

In general, there are three important methods of allocating the joint costs of production to the joint products:

a. The market price method, whereby common costs are allocated to the several commodities in proportion to the relative market values of the products obtained.

b. The unit method, whereby the common costs are distributed to joint products on the basis of the proportionate amount of common material in terms of pounds, tons, board feet, or gallons found in the ultimate products.

c. The survey method, whereby common costs are allocated to joint products arbitrarily after consideration of a number of important factors such as volume, selling price, technical engineering, and marketing processes.

Market Price Method of Allocating Joint Costs to Products. Probably the most common method of apportioning joint costs to joint products at the point of separation is to divide the total costs according to the proportion that the total selling price of each of the joint products bears to the total selling price of all joint products. The method is based on the theory that products that have the highest selling price should bear the largest share of the common costs of production. It is used extensively by lumber mills, oil refineries, and similar industries in which it is desirable to allocate material and other common costs on an easy and reasonably equitable basis in the absence of more exact calculations. The costs incurred in processing each product beyond the point of split-off are frequently deducted from the total selling price of each joint product before the computations are made. The method is illustrated by an example shown as Exhibit 84. In the illustration on page 272, it is assumed that the total joint costs to the point of separation are $7 and that the basis of allocation is the proportionate amount of the market price of each product less its cost of manufacture beyond the point of separation from its joint cost stage of production. It is simpler but less accurate to use the actual market value of joint products as the basis for the allocation; the manufacturing and marketing costs beyond the point of separation are not considered.

The market price method presents a number of problems in the determination of relative selling values. Fluctuating market prices may complicate the procedure of computing the market values of each product and, as a result, it may be necessary to use an average market price each month for each product. In many cases the selling prices of products may not be an accurate indicator of costs incurred in their manufacture up to the point of separation; likewise, the selling prices may reflect in part the income received for costs applied to products subsequent to the division point rather than the cost of processing the original material found in products at the point of separation. The method is more accurate when relative selling values are determined as of the point of the division of the common materials into the joint commodities.

EXHIBIT 84

MARKET PRICE METHOD OF ALLOCATING JOINT COSTS TO PRODUCTS

Products	Market price of joint products	Cost of manufacture beyond point of "split-off"	Market price less cost of manufacture beyond point of "split-off"	Base of allocation	Joint cost apportioned to joint products
X	$ 3.00	$1.00	$ 2.00	1/7	$1.00
Y	4.50	0.50	4.00	2/7	2.00
Z	9.50	1.50	8.00	4/7	4.00
	$17.00	$3.00	$14.00	7/7	$7.00

The inventory value of completed products consists of the sum of the allocated amount of the common costs made to the individual commodity plus the direct and distinguishable costs incurred in the subsequent processing of the product.

Other Applications of Market Price Method. The use of the market price method of allocating joint costs to products is not restricted to manufacturing and extractive industries. Dairies frequently allocate joint costs of production to their several products, butter, cream cheese, cottage cheese, milk, buttermilk, and ice cream, on the basis of their selling prices or sales value.

Trucking companies may determine the profitableness of various classes of merchandise hauled by distributing total trucking costs to types of freight on the basis of rates charged.

In the development of a real estate subdivision or of a cemetery, realtors frequently allocate the total costs of developing the tract to lots upon the basis of their estimated sales value. Thus, as each lot is sold, its share of the total cost of the subdivision can be determined and a gross profit figure obtained.

Unit Method of Apportioning Joint Costs to Products. This method provides for the allocation of the common costs of joint products to the respective units of production upon the basis of the physical volume of the basic materials found in the joint products at the point of separation. The unit of measurement varies with the types of products, but the more common units include pounds, tons, gallons, bales, and board feet. The method is illustrated in an example shown as Exhibit 85, in which it is assumed that the unit of measurement is gallons and that the joint costs of production are $20 for each 50 gal. processed. When there is a loss of volume in processing, an allowance must be made through the distribution of the total waste or loss to the recovered products.

EXHIBIT 85

UNIT METHOD OF APPORTIONING JOINT COSTS TO PRODUCTS

Products	Yield, in gallons of products per 50 gal.	Percentage of gallons of joint products to total	Joint costs apportioned to products
X	20	40	$ 8
Y	5	10	2
Z	25	50	10
	50	100	$20

After the allocation of joint costs to the various joint products has been made, the direct items of cost can be determined for each product from the point of separation to the stage of completion. The inventory value is the sum of the allocated amount of the common costs made to the individual commodity plus the direct and distinguishable costs incurred in the subsequent processing of the product.

A criticism of this method is that the allocation of joint costs on the basis of volume or physical unit may give results inconsistent with actual conditions if the true allocation should be in proportion to the content and not to the quantity of the original materials found in the completed product. Under such conditions the solution lies in making the allocation on some weighted physical unit or volume basis.

Survey Method of Apportioning Joint Costs to Products. The realization that there is no entirely satisfactory method of allocating joint costs of production to products manufactured simultaneously has led some manufacturers to adopt an arbitrary plan of apportionment, based upon consideration of all the important factors involved in producing and marketing the various products. The division of total joint costs among products arising from the conversion process is made on a percentage basis. The percentages are computed arbitrarily by the management of the enterprise, with the help of major department heads and technical advisors.

The plan is to make an extensive survey for the purpose of collecting information regarding all factors involved. The production departments obtain data regarding the volume of each product in terms of pounds, tons, or some common unit; the engineering and planning departments study the technical problems involved in the joint production; the sales division provides information concerning the selling price and marketing problems connected with each product; and the administrative division acquires data regarding the financing and administrative problems involved. The management considers the various factors involved and then prepares a schedule of percentages or weights in terms of points showing its appraisal of the proportionate amount of the total joint costs that should be borne by each product. The percentages or weights can be used period after period until there are changes in methods of production and sale or in selling prices.

An illustration of the method can be found in the canning industry.[1] Fruit for canning is generally purchased at a flat price per ton, but out of a ton of fruit will come many grades of finished pack. The cost of the raw product cannot be charged at a uniform price per pound to the various grades because the selling prices on the lower grades are not high enough to return the average price per pound on the fruit canned. Thus the better grades must be charged for more than average price to make up for the deficiency in the lower grades.

In determining proper grade differentials, the cost accountant must determine such factors as selling price of the various grades, size of cans, and mixtures of fruit and sirup, exemplified by combinations of peaches, pears, cherries, pineapple, and grapes in a can of fruit cocktail. Arbitrary differentials are generally used in the industry. In the case of peaches, the differentials are: Fancy, 130; Choice, 115; Standard, 100; Seconds and Water, 75; and Pie, 50. Thus the total cost of the fruit is prorated over the entire pack so that the cost of Fancy grade will be 30 per cent more than Standard; Choice, 15 per cent more than Standard, etc. These differentials are generally applied to fruit delivered at the cannery and include the price paid to the grower plus freight, hauling charges, buying costs, and receiving costs. Labor costs are charged to the various grades at a uniform price per pound, but overhead costs are generally allocated in proportion to the total direct costs, including labor costs, charged to the different grades.

The survey method just described is generally considered more equitable than either the market price or unit methods, because a combination of related factors is considered.

[1] BARR, R. H., "The Use of Standard Costs in the Canning Industry," *National Association of Cost Accountants Bulletin*, July 1, 1941, pp. 1282–1298.

BY-PRODUCT ACCOUNTING

By-products are joint cost products that have a market value that is relatively unimportant in comparison with the selling prices of main products; consequently it is considered impractical to attempt to apportion to the by-products any part of the joint costs of production up to the point of split-off. If products have a relatively important selling price as compared with other products of the conversion process, such products should be considered as joint cost products and should receive a portion of the joint costs up to the point of split-off. By-products are substances such as steel filings, sawdust, scrap paper, bran, slag, and remnants of cloth. Daily or weekly, such materials are taken from production departments to stockroom or storage facilities in yards to await sale or consumption within the plant. Generally scrap materials are sold by the ton or bale, but occasionally such materials as shavings and sawdust can be used by the shipping department for packing purposes.

Two problems arise in regard to the proper handling of by-products: the problem of valuation and the determination of the account to be credited for the sales value. The market value is deemed to be the proper valuation for a by-product, because its cost cannot be determined. It is accepted as the correct value for inventory purposes by the U.S. Internal Revenue Service. The market price of such materials is subject to daily fluctuations, and, since they may be sold weekly or monthly, it is advantageous to price a specific quantity at the average market price of such materials when a sizable quantity has been accumulated.

The accounting methods for handling by-product values may be classified as follows:

a. All income received from the sale of by-products is considered as other income. The major commodity bears all costs of production, and its sales yield the operating income.

b. The income realized from the sale of by-products is deducted from the cost of production.

c. The income realized from the sale of by-products, less both selling costs incurred in the sale and manufacturing costs applied to the by-products after they achieve a separate existence, is deducted from the cost of production of the major products.

In the sections that follow, only the essence of the different accounting methods is presented; in any given concern the method chosen is molded to the particular situation and is influenced by the cost of operating the system and by the type of information the management desires.

By-product Revenues as "Other Income." If all revenue received from the sale of by-products is considered as other income, it is obvious that, for periodic statement purposes, the major product inventory values and the cost of goods sold figures are overstated and the operating profit is understated. The chief advantage of this method is that it is both easy and economical to operate. It is used most extensively in those firms where the by-products are unimportant, where the management's interest is in unit control and net results rather than in close analysis, or where a more analytical system is impractical.

The general ledger entry required to record the sale of by-products when they are considered as other income is as follows:

Cash or Accounts Receivable........................xxx
Revenue from Sale of By-products..........................xxx

One of the outstanding difficulties with this method is in the valuation of inventories for balance sheet purposes. Normally no value is given to the by-product inventory, whereas the major commodity is shown at an inflated value. If this method is used, it is suggested that, for informational purposes, the by-product inventory should be listed in a footnote at its estimated selling price. Likewise, an analysis of conditions in a particular enterprise may disclose that the major commodity inventory may be overstated by more or less than the value of unrecorded by-products on hand, since either of the two products may have the faster turnover.

By-product Revenue as a Reduction in Cost of Production. In job order plants, if the work in process involves large jobs from which are obtained by-products of considerable value, unquestionably the best method of accounting for the by-products is to credit the job with the estimated market value of the materials when they are taken to the stockroom or placed in storage. Exhibit 86 is an example of a by-product report prepared for a production department.

The proper entries are as follows:

Entry in general ledger:
Materials Control (or By-product Inventory)...........xxx
Materials in Process..xxx
Entry in subsidiary records:
Quantity and market value recorded in the received section of the stock ledger accounts for by-products; entry in the proper production orders as a credit to the material cost of the orders.

The above method is frequently not practical because it is impossible to determine the production orders from which the scrap was obtained. In addition the quantity of materials and the value may be so small that accounting for it in terms of each job is impractical.

A second method, which consists of treating the value of scrap materials as a reduction of general overhead costs, is favored more frequently. It is good accounting theory to consider any revenue obtained as a by-product of manufacturing operations as a reduction in the cost involved in the processing. Since the residual value cannot be attributed to a particular job, the next best treatment is to reduce the overhead costs of all jobs responsible for the scrap materials. According to this plan the entries required are as follows:

Entry in general ledger:
Materials Control (or By-product Inventory)...........xxx
Factory Overhead Control..................................xxx

Entry in subsidiary records:

Quantity and market value entered in the received section of the stock ledger accounts for by-products; entry in the standing order for by-products as a credit to the production departments responsible for the accumulation of scrap materials.

An advantage of the method is that the Factory Overhead Control account need not be credited until the end of each accounting period.

By-Product Report No.__________

Department No.________ **Date**__________

Production order No.________ **Account credited**__________

Stock account No.	Type of material	Quantity	Description of condition	Estimated unit value	Estimated total value

Returned by__________ **Received by**__________

Exhibit 86.

Thus it is possible to carry only the quantity to the stock records for by-products and to delay pricing the material until it is actually sold. The credit entry to the Factory Overhead Control account can be made monthly for the exact amount received from the sale of by-products.

If a process cost system is used in an industry, the value of by-products may be credited to the process or operation responsible for their existence, since the value of such residues are a legitimate reduction in the operating costs and average unit costs of the process or operation. However, this method may not be accurate in many instances, because the material costs may have been charged to processes or operations that preceded the processing that produced the by-products.

By-product Revenue, Less Selling and Manufacturing Costs, Deducted from Cost of Major Commodity. A number of different situations may exist in the production of by-products. In some firms the by-products are ready for sale at the moment they achieve a distinct existence, but in other concerns they are subjected to further processing before their ultimate sale. The third method illustrates a system for by-product accounting in which, after a certain stage of production, the direct materials and labor applied to the by-products can be ascertained. Under this method the manufacturing costs are applied after by-products assume a separate existence, and the selling costs incurred in their sale are deducted from the selling price of the by-products; the balance remaining is deducted from the cost of the major commodity. The calculation of the cost of the major commodity product is as follows:

Statement of Manufacturing Costs for Major Commodity

Materials	$30,000
Labor	20,000
Overhead	25,000
Cost of production to point of split-off of by-products	$75,000
Less: Net yield from sale of by-products (schedule A)	4,700
Net cost of major commodity at point of split-off	$70,300
Add: Costs on major commodity after split-off:	
Material	1,000
Labor	5,000
Overhead	5,000
Net cost of finished major product	$81,300

Schedule A

Analysis of Revenue from Sale of By-products

Sales of by-products			$20,000
Cost of production subsequent to split-off:			
Material	$5,000		
Labor	8,000		
Overhead	2,000	$15,000	
Selling costs, by-products		300	15,300
Net yield from by-products			$ 4,700

The logic of the general method is based upon the concept that the selling values of by-products are often indicative of their actual cost, in terms of production costs, and that the deduction of this net yield from the cost of the major commodity does, to a rather accurate degree, indicate the true cost of the major commodity alone. Those who oppose this method contend that the selling price of by-products is subject to a supply-and-demand determination of its own, which exists quite apart from that applicable either to raw materials or to the major commodity. In this respect it is suggested that the relative bargaining position of the firm in the sale of by-products may have an unwarranted reflection in the calculated unit costs of the major commodity. In cases where by-product selling prices fluctuate widely, this is a just criticism.

CHAPTER XV

ESTIMATE COST ACCOUNTING SYSTEMS

Estimate cost accounting systems are discussed in advance of the detailed explanation of standard costs since the former antedates the latter in use. Various forms of estimate cost accounting plans have been in use since the infancy of cost accounting, but standard costs are a recent development, an outgrowth of scientific management during the last 30 years.

Extensive Use of Estimate Costs. Estimate costs, also termed "specification" or "formula costs," are used as a short cut by many concerns that find it impractical to maintain complete cost accounting systems. Such a variety of estimate cost plans are in use that it is impossible to classify them by types. Even the simplest forms of mental cost calculations are, in the strict sense of the phrase, cost estimates. The garage mechanic who compiles the average cost of grinding the valves on various types of cars has an estimate cost plan which, though simple, may be adequate for his purposes. Plans for estimating costs become increasingly necessary as business enterprises become more complex. Companies engaged in construction work of all kinds, such as houses, office or factory structures, bridges, tunnels, and shipyards, and other types of concerns, such as canning factories, bakeries, bottling works, candy, medicine, and dairy companies, have found this form of cost system of practical value. The facts that labor is strongly unionized with wage contracts in force for a fixed period of time and that materials are purchased some time in advance permit the successful use of estimate cost systems in such industries as clothing and shoe manufacturing.

It may be safely said that every businessman who manufactures or produces commodities has some form of estimate cost planning even if there is no connection between his cost statistics and his accounting records. Discussion in this chapter is limited to the more advanced forms of estimate cost systems which provide for the tying in of cost estimates with accounting records.

General Principles Underlying Estimate Cost Systems. Estimate costs are not complete cost systems. A basic accounting system, either the process or the job order cost system, is required to record the actual manufacturing or production costs at the end of the accounting period so that a proper comparison can be made with the predetermined costs which were prepared before operations began. If estimate cost plans are to be used successfully, they must be superimposed upon or appended to a historical cost system.

The general characteristics or principles underlying all types of estimate cost systems are the same. The purpose is to predetermine for each product the actual cost figures which can be used by management as a guide to or a basis for pricing and production cost control during the period. At the beginning of each period an estimate of the unit costs is made for each product or class of products in terms of the various elements of cost, direct material, direct labor, and overhead, and an estimate cost card is kept for each product or class of products to show in detail the estimates. During the cost period the actual material, labor, and overhead costs are recorded in summary accounts in the general ledger, and at the end of the period the accounting records provide a means of comparing the estimates with the actual production costs. In some concerns the verification of the actual and estimates may be done in total; the estimated costs are multiplied by the units produced, and the total thus secured is compared with the total manufacturing costs. It is possible to make a detailed comparison of the estimated and actual costs by the various elements of cost, material, labor, and overhead, so that errors may be localized in specific portions of the unit costs. In other cases the verification is made both by elements of cost and by departments or processes. The comparison of actual and estimated costs permits the revision of the estimates periodically.

Importance of Budgeting in Formulating Estimates. By the use of estimate costs the manager is attempting to establish a set of predetermined cost figures for each product. He is attempting to devise a set of figures which will be truly representative of the actual costs to be incurred during the next fiscal period. His interest is not in past costs, in normal costs over a long period, or in standard costs which would serve as a goal or measuring stick of efficiency. His interest is in developing sets of figures which will coincide as closely as possible with the actual costs for the period in prospect. The accuracy with which the estimates can be compiled will determine the effectiveness of the system. If, at the end of the period, variances indicate that the estimates are very far below or above the actual production costs, the manager will have been using a tool to guide him in his policies that is so inaccurate as to be useless and even of negative value.

It is frequently assumed that the preparation of estimates is a comparatively easy task. It is taken for granted that the manager or cost accountant should use such records of past operations as may be available. The assumption underlying such a suggestion is that labor, material, and overhead costs, as well as the conditions of production, will be the same during the ensuing period as were those in past periods. A study of the unsettled conditions in nearly every field of business would disprove this assumption. Thus it may be concluded that, in most industries, past experience alone has little to do with the present and is unreliable as a management tool for future periods because operating and cost conditions change so rapidly.

Scientific estimates of costs and of the operating conditions which will exist during the next period can be established only through exhaustive research into the probable conditions of production and costs. Budgeting is the most efficient means of recording the expected conditions of production for the next period, and the proper functioning of an estimate cost system is dependent upon well-planned and scientifically prepared budgets.

It is necessary to examine more closely the preparation of schedules of estimated costs under the three heads, material, labor, and overhead, in order to show how dependent such a compilation of data is upon production and manufacturing budgets.

Estimating Material Costs. Estimates of material costs are based upon the quantity of each kind of material to be used in each product or class of products and upon the material prices expected to prevail during the period for which the estimates are made. Estimates of the quantities of material necessary to manufacture a single unit of each kind of product are made from the records of past experience, supplemented by a critical study of each operation comprising the total productive process. The determination of the amount of material per unit of product is largely an engineering problem and is based on the quantity of pieces, pounds, or feet which has been used in the past in making the article. The survey of the material specifications on file is often supplemented by test runs; a careful record of the material used in each process is kept, and due allowance is made for spoilage and shrinkage. The various estimated quantities of each kind of material needed to complete the product may be listed in the material section of the estimate cost card for a given product.

Two remaining problems, the estimation of the total quantities of each class of material needed for the period and the estimation of the price to be paid for the material, are directly dependent upon the production and purchasing budgets. The material prices for past periods, as shown by the records of the purchasing department, are valuable, but they cannot be used exclusively as an index of the prices which will prevail during the next period. Likewise, in many cases, the price paid varies with the quantities purchased, since quantity discounts may be given by suppliers.

Two broad classes of material may be distinguished: (*a*) special materials and parts made to definite specifications and (*b*) materials which can be purchased in the open market. The first group of products includes bolts, screws, castings, and machine parts. This class of material is usually contracted for some time in advance and is not susceptible to rapid changes in market price. Contract prices, recent quotations, or late price lists may be used in conjunction with the production for the period as shown in the production budget. Additional data, such as the amount of each kind of material needed to produce each product (as detailed in the estimate cost card) and the number of units of each class of finished product scheduled for manufacture in the production budget, should be adequate information for the purchasing department to compute quantity discounts and to estimate prices for this class of materials. Thus, in estimating costs for material, the production budget showing the expected production of each class of products is of primary importance in computing quantity purchases and discounts.

The second class includes such materials as copper, pig iron, steel, and lumber, all of which have a varying market price. After the quantity of each class of material per unit of product is obtained from test runs and from past experience and after the expected production of each type of product is drawn from the production budget, the material needs must be translated into estimated material costs. Price estimates for this class of material can be prepared from an analysis of the existing market conditions and a forecast of the probable conditions which will exist during the ensuing period. All the elements of price forecasting should be considered and reflected in the purchasing budget.

If the estimates of material costs are to be correct, the estimated transportation and handling costs should be added. Transportation charges and cartage or trucking costs can be estimated by using past cost records and the existing scale of rates. The total estimated charges may be allotted to the various classes of material, for entry on the estimated cost cards, on such bases as estimated value or quantity of purchases for the period.

Estimating Labor Costs. Estimates of labor costs are dependent upon the time required of direct laborers to complete a unit of product and upon the wages expected to prevail during the period covered by the estimates. The rate of production of workers and the wage rates per hour or piece are the two most important factors. Where workers are employed on separate piece-rates which are likely to remain constant during the period, no budget prerequisite is necessary for accurate labor estimates. The piece-rates for the various operations or units may be added together to obtain the total cost to complete each type of product.

The factor of productivity of the worker does become a problem in cases where hourly or daily wages are paid or piece-rate wage systems are being installed. The time required for direct labor on a unit of the product may be estimated from past experience or may be secured by time and motion studies through the use of stop-watch observations. Due allowance must be made for loss of time caused by the inability of workers to equal capacity performance and by the inefficiencies of beginners. The estimated time required for each operation should be multiplied by the estimated wage in order to obtain the estimated labor cost of completing the product.

Dependence upon a labor cost forecast, as recorded in a labor budget, is necessary only when labor rates are likely to change during the ensuing period. If labor market conditions are relatively stable, existing labor rates can be used. If, however, labor rates show an upward or downward tendency, a labor budget exhibiting the labor requirements and the wage rates expected to prevail during the budget period would prove invaluable in estimating unit labor costs. In most cases the average of the labor rates, which are predicted will prevail during the period, would be the most advantageous base to use in computing the estimated direct labor unit costs.

Estimating Manufacturing Overhead. If the management desires the compilation of unit cost estimates for overhead which will approximate those expected to prevail during the period, factory overhead budgets and production budgets should be prepared to reflect the forecasted conditions. In concerns not employing a departmental form of organization, a budget of overhead should be prepared to show in detail each class of cost for the ensuing period. A budget of production should also be formulated to show the expected output for the period in terms of units, direct labor-hours, direct labor cost, or machine-hours. The estimated overhead, as shown in the overhead budget, should be divided by the estimated production recorded in the production budget. The rate so obtained can be used to compute the amount of overhead which should be applied to each unit of the product or to each hour or dollar of direct labor. If the rate is based on the hour or dollar of direct labor, it will be necessary to add together the hours or the dollars of direct labor or fractions thereof normally required to complete the product and to multiply this amount by the rate, in order to obtain the estimate of overhead per unit of the product.

If the departmental plan of operation exists, the same general procedure is followed, except that the budgets of overhead and the production budget are prepared for each operating department, and separate departmental overhead application rates are computed. A more detailed discussion of computing overhead application rates is unnecessary because the procedure is identical with the one explained in connection with job order cost accounting.

Estimate Cost Cards. Estimate cost cards are the "heart" of the estimate cost accounting system. Estimates of the cost of direct material, direct labor, and overhead for each product are tabulated on a cost card which becomes the basis for cost information regarding the product during the accounting period, or until a revision of the cost estimate becomes necessary.

The type of cost card used varies with the requirements of the individual firm. If there are only a few operations required to manufacture a product, it is possible to prepare a cost card that shows the estimated direct material, direct labor, and overhead costs for each product for each operation. The operations may consist of benchwork, a machine operation, a combination of skilled labor and machine work, a subassembly or an assembly. If there are 10 or more operations required to complete a product, there may be 10 cost cards, each of which shows the estimated costs of a single operation or assembly. In order to obtain the total estimated cost of the finished product, it is necessary to add the estimated costs on the 10 cost cards. Generally a master cost card is used to summarize the total estimated cost of the product which is shown in detail on separate cards.

Estimate cost cards prove invaluable in preparing price lists and bids for work and in estimating the cost of jobs which are to be scheduled for production. Exhibit 87 illustrates a simple form of estimate cost card for a product that is processed in three production departments.

Methods of Accounting for Estimate Costs. Many different methods of accounting for estimate costs are employed in business enterprises. It is probable that, in the majority of cases, the estimates are independent of the general ledger accounting data and that no attempt is ever made to compare the estimates with actual costs. These plans are not rightly termed cost accounting, and such methods, which are in the nature of "scratch paper" calculations, are not discussed in this book.

ESTIMATE COST CARD No. 10
Product: TM Style: RS Date of estimate: Jan. 2, 19—

Estimated cost	Dept. A	Dept. B	Dept. C	Total estimated cost
Materials and supplies:				
5 units of X @ 50¢	$2.50			
10 units of Y @ 10¢		$1.00		
1 unit of Z @ 75¢			$0.75	$ 4.25
Labor cost:				
2 hr. @ $1.70	3.40			
1 hr. @ 1.45	1.45			
4 hr. @ 1.50		6.00		
3 hr. @ 1.60			4.80	15.65
Overhead cost:				
3 hr. @ $0.80	2.40			
50% of $2.00		1.00		
3 hr. @ $1.00			3.00	6.40
Total estimated cost	$9.75	$8.00	$8.55	$26.30

Exhibit 87. Estimate cost card.

From the many methods of accounting for estimate costs, three have been selected as the most logical and practical in application.

a. A complete system of job order cost accounting, with estimate costs carried in production orders and accounting records for comparative and statistical purposes only.

b. Use of separate work in process accounts for each element of cost for the purpose of comparing estimated and actual costs at the end of each accounting period.

c. Use of a separate work in process account for each production department for the purpose of comparing estimated and actual costs at the end of each accounting period.

Estimate Costs Used in Connection with Job Order Cost Accounting. A number of manufacturing concerns, which employ job order cost accounting methods, have found it advantageous to record on each production order before processing begins an estimate of the material, labor and overhead forecasted for the job. A comparison between the estimated and actual costs can be made as the work progresses.

One large paper manufacturing concern, which specializes as a paper converter in coating and finishing paper stock for labels and wrappers, produces for special order. The cost department is requested to prepare an estimate of the cost of each job before a price is quoted to a customer. Past experience, cost sheets of similar jobs, and a forecast of material, labor, and overhead costs are the basis for the cost estimate for the job in prospect. When the specifications and the job requirements are recorded on a production order to accompany the work through the plant, the estimated costs are recorded on the production order so that a comparison can be made between the estimated and the actual costs as each stage of the work is completed. Cost variances are indicated for material, labor, and overhead; hence the degree of accuracy with which the estimates were made for pricing purposes is apparent. In this particular concern the estimates appear only on the production orders with no relationship existing between the general ledger record of actual costs and the estimates. Therefore there is no problem encountered in disposing of variances between actual and estimated costs. The estimates of cost and variances between the estimates and actual costs are of statistical value only and of no accounting significance.

A variation of an improvement in the plan just explained can be effected by recording the total estimates of material, labor, and overhead costs in the Materials in Process, Labor in Process, and Overhead in Process accounts beside the actual costs; in this way the variance between the total estimates and the total actual costs for the period can be determined. The total estimates and variances are recorded in the general ledger accounts for work in process but are for comparative and statistical purposes only, and, consequently, no disposition need be made of the variances.

Exhibit 88 illustrates the use of estimate costs as an appendage to the job order cost system.

Use of Separate Work in Process Accounts for Each Element of Cost. A second plan, which is more commonly employed, requires the incorporation of cost estimates in the general ledger accounts in connection with a system of process accounting. This plan is used in mass-production plants in which it is impractical to compare estimates and actual costs of production from day to day and in which an average cost per unit of product is suitable. The comparison is made at the end of the accounting period when totals of estimated and actual costs for each cost element are brought together in work in process accounts.

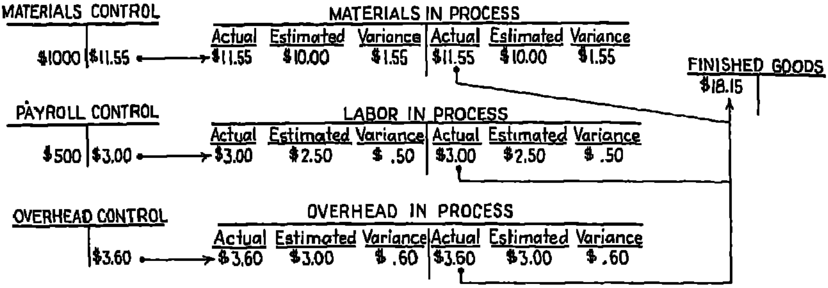
The accounting procedure underlying this method may be stated as follows:

a. The unit costs of each element of the various products to be manufactured during the period are estimated at the beginning of the period.

b. During the accounting period, the cost estimates are used as a basis for costing goods completed; Materials in Process, Labor in Process, Overhead in Process are credited and Finished Goods is debited for the estimated cost of products completed.

EXHIBIT 88

DIAGRAM OF A JOB ORDER COST SYSTEM CONTAINING ESTIMATE COSTS AS STATISTICAL DATA



Production order No.101 Product: ST	Date: Feb. 2, 19..... Units required: 100		
	Estimated cost	Actual cost	Variance
Materials			
Est: 10 units of x @ $1.00 Act: 11 units of x @ $1.05	$10.00	$11.55	$1.55
Labor			
Est: 1 hour @ $ 2.50 Act: 1 hour @ $ 3.00	2.50	3.00	.50
Applied overhead			
Est: 5 hours @ 60¢ Act: 6 hours @ 60¢	3.00	3.60	.60
Total cost	$15.50	$18.15	$2.65

c. When products are sold during the accounting period, Cost of Goods Sold is debited and the Finished Goods account is credited for the estimated cost of goods completed.

d. During the accounting period the actual cost of materials is recorded in the Materials Control account; the actual cost of labor is charged to the Payroll Control account; and the actual indirect costs are accumulated in the Overhead Control account.

e. At the end of the accounting period, the actual cost of direct materials consumed in production, according to material requisitions, is credited to Materials Control and debited to Materials in Process; the actual cost of direct labor is credited to the Payroll Control account and debited to Labor in Process; and the actual amount of overhead, including indirect materials and labor, is credited to the Overhead Control account and debited to Overhead in Process.

f. As a part of the process of closing the books, it is necessary to evaluate the inventory of work in process at estimated cost and to transfer the inventory value to a Work in Process Inventory account.

g. The balances remaining in the work in process accounts represent the variances between actual and estimated costs. The balances are transferred to Material, Labor, and Overhead Variance accounts.

h. Variances are disposed of by correcting work in process inventory, finished goods inventory, and cost of goods sold for the amount of the error in the cost estimates so that cost records are corrected to actual costs.

i. At the beginning of the next accounting period, the cost estimates of material, labor, and overhead are revised in accordance with errors localized in the variance accounts of the previous period, due consideration being given to forecasted changes in costs for the ensuing period.

EXHIBIT 89

DIAGRAM OF THE FLOW OF ACCOUNTING ENTRIES WHEN SEPARATE WORK IN PROCESS ACCOUNTS ARE USED FOR EACH ELEMENT OF COST IN AN ESTIMATE COST SYSTEM

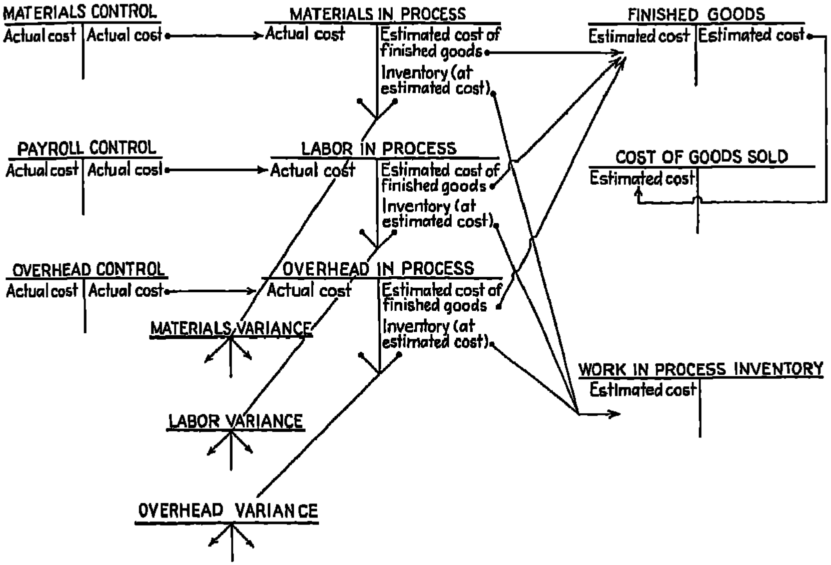


Exhibit 89 is a diagram showing graphically the use of separate work in process accounts for each element of cost when an estimate cost plan is used.

Accounting Procedure Illustrated by a Problem. The accounting procedure outlined above is given concrete form through the use of a problem and its solution:

Illustrative Problem

The Acme Box Factory manufactures a standard packing box which is used by 60 manufacturing plants in the Middle West. Prices must be quoted and manufacturing plans formulated before the beginning of the calendar year.

The estimated cost and quoted selling price per hundred boxes for the first 3 months of the year are shown on an estimate cost card as follows:

Material cost	$1.50
Labor cost	2.00
Overhead (50% of direct labor cost)	1.00
Total estimated cost	$4.50
Quoted selling price per hundred	$7.00

The inventory of materials on Jan. 1, 19— was $2,000. During the first quarter of the year, which ended Mar. 31, 19—, the following transactions were recorded:

Purchase of materials	$13,000
Payrolls:	
Direct labor	16,500
Indirect labor	2,500

Overhead costs (exclusive of indirect materials and labor) for the period were repairs, $300; rent, $1,000; power, $200; depreciation, $2,000; taxes, $500.

Materials consumed according to requisitions:

Direct materials	$12,200
Indirect materials	$ 1,000

Boxes started in production	810,000
Boxes completed during the period	800,000
Boxes sold and shipped during the period	600,000

The closing inventory of work in process on Mar. 31, 19— consisted of 10,000 boxes which had received all material cost and were estimated to be ½ completed as to labor and overhead costs.

Solution

JOURNAL ENTRIES

Purchase of materials costing $13,000:

Materials Control	$13,000	
Vouchers Payable		$13,000

Vouchering of payrolls totaling $19,000:

Payroll Control	$19,000	
Vouchers Payable		$19,000

Vouchering of repairs, $300, rent, $1,000, and power, $200; recognition of depreciation, $2,000 and taxes accrued, $500:

Overhead Control	$ 4,000	
Vouchers Payable		$ 1,500
Accumulated Depreciation		2,000
Accrued Taxes Payable		500

Recording of the estimated cost of production of 800,000 boxes completed and transferred from work in process to finished stock during the period; estimated cost, $4.50 per hundred:

Finished Goods	$36,000	
Materials in Process		$12,000
Labor in Process		16,000
Overhead in Process		8,000

Recording sale of 600,000 boxes at estimated cost of $4.50 per hundred and a sales value of $7 per hundred:

Cost of Goods Sold	$27,000	
Finished Goods		$27,000

Accounts Receivable	$42,000	
Sales		$42,000

Distribution of the payroll for the accounting period—direct labor, $16,500; indirect labor, $2,500:

Labor in Process	$16,500	
Overhead Control	2,500	
Payroll Control		$19,000

Distribution of cost of materials consumed during the period, direct materials, $12,200; indirect materials, $1,000:

Materials in Process	$12,200	
Overhead Control	1,000	
Materials Control		$13,200

Distribution of actual overhead to work in process:

Overhead in Process	$ 7,500	
Overhead Control		$ 7,500

Payment of vouchers for the period:

Vouchers Payable	$33,500	
Cash		$33,500

Transfer of inventory value of 10,000 boxes remaining in process to inventory account. Inventory is valued at estimated cost; boxes have received all material value, while the production is estimated to be ½ completed as to labor and overhead:

Work in Process Inventory	$300	
Materials in Process		$150
Labor in Process		100
Overhead in Process		50

Closing of work in process accounts and transferring variances to variance accounts:

Materials Variance	$ 50	
Labor Variance	400	
Overhead in Process	550	
Overhead Variance		$550
Materials in Process		50
Labor in Process		400

Transfer of variances to work in process inventories, finished goods, and cost of goods sold to correct the accounting records to actual costs. It is assumed that the variances occurred because of incorrect estimates:

Overhead Variance	$550.00	
Materials Variance		$ 50.00
Labor Variance		400.00
Work in Process Inventory		0.31
Finished Goods		24.70
Cost of Goods Sold		74.99

The percentage of error in the estimates is computed as follows:

$$\frac{\text{Variance}}{\underset{\text{(estimated value)}}{\text{Cost of completed production}} + \underset{\text{(estimated value)}}{\text{end inventory of work in process}}}$$

Material variance:

$$\frac{\$50}{\$12{,}000 + \$150} = 0.0041$$

Labor variance:

$$\frac{\$400}{\$16{,}000 + \$100} = 0.0248$$

Overhead variance:

$$\frac{\$550}{\$8{,}000 + \$50} = 0.0683$$

The application of the percentage of variance to each element of cost is made as follows:

MATERIALS COST ADJUSTMENT

	Quantity, boxes	Original balance	Corrected balance	Amount of adjustment
Materials in process........	10,000	$ 150	$ 150.62	$ 0.62
Finished goods.............	200,000	3,000	3,012.36	12.36
Cost of goods sold..........	600,000	9,000	9,037.02	37.02
Total..................	810,000	$12,150	$12,200.00	$50.00

LABOR COST ADJUSTMENT

	Quantity, boxes	Original balance	Corrected balance	Amount of adjustment
Labor in process.........	10,000 (½ completed)	$ 100	$ 102.49	$ 2.49
Finished goods..........	200,000	4,000	4,099.60	99.60
Cost of goods sold......	600,000	12,000	12,297.91	297.91
Total................	810,000	$16,100	$16,500.00	$400.00

OVERHEAD COST ADJUSTMENT

	Quantity, boxes	Original balance	Corrected balance	Amount of adjustment
Overhead in process.......	10,000 (½ completed)	$ 50	$ 46.58	$ 3.42*
Finished goods............	200,000	2,000	1,863.34	136.66*
Cost of goods sold.........	600,000	6,000	5,590.08	409.92*
Total.................	810,000	$8,050	$7,500.00	$550.00*

* Deduction—credit variance.

RECAPITULATION OF ADJUSTMENT

	Material cost	Labor cost	Overhead cost	Net adjustment
Work in process inventory	$ 0.62	$ 2.49	$ 3.42*	$ 0.31*
Finished goods	12.36	99.60	136.66*	24.70*
Cost of goods sold	37.02	297.91	409.92*	74.99*
Total	$50.00	$400.00	$550.00*	$100.00*

* Deduction—credit variance.

Transfer of Cost of Goods Sold account, corrected to actual cost, to Profit and Loss account:

Profit and Loss	$26,925.01	
Cost of Goods Sold		$26,925.01

Transfer of Work in Process Inventory, corrected to actual cost, to work in process accounts as beginning balances for the next accounting period:

Materials in Process	$150.62	
Labor in Process	102.49	
Overhead in Process	46.58	
Work in Process Inventory		$299.69

SCHEDULE OF REVISED COST ESTIMATES

	Original estimates	Percentage of error	Revised estimates
Material cost	$1.50	0.0041	$1.506
Labor cost	2.00	0.0248	2.05
Overhead	1.00	0.0683*	0.93
Total estimated cost	$4.50		$4.486

* Deduction—credit variance.

Materials in Process

Actual cost from Materials Control account	$12,200	$12,000	Estimated cost of finished goods
		150	Inventory at estimated cost
		50	Variance
	$12,200	$12,200	
Beginning balance, adjusted to actual cost	$150.62		

Labor in Process

Actual cost from Payroll Control account	$16,500	$16,000	Estimated cost of finished goods
		100	Inventory at estimated cost
		400	Variance
	$16,500	$16,500	
Beginning balance adjusted to actual cost	$102.49		

Overhead in Process

Actual cost from Overhead Control account	$7,500	$8,000	Estimated cost of finished goods
		50	Inventory at estimated cost
Variance	550		
	$8,050	$8,050	
Beginning balance adjusted to actual cost	$46.58		

Computation of Work in Process Inventory Valuation. In the above illustration the three work in process accounts are debited for the actual material, labor, and overhead cost of goods started in process and are credited for the estimated cost of goods completed and transferred to Finished Goods. If there are no units remaining in process at the end of the accounting period, the balances of the work in process accounts represent the existing variances between actual and estimated costs. If there are units of the product remaining in process at the end of the accounting period, it is necessary to estimate the stage of completion and the value for the production in terms of each cost element, materials, labor, and overhead.

The evaluation of work in process inventory is identical with the methods explained in Chap. XII, which deals with process cost accounting, except that the units in process are costed at estimated costs rather than at actual costs. It is necessary to determine first the stage of completion of the products in process, which can be done only by an examination of each batch of production. Thus material may all be put into production at the beginning of the process, with the result that products are considered to have their full material value; material may be added at various stages of the process, which necessitates an estimation of the stage of production. In the problem solved in the preceding section, it was assumed that goods remaining in process have received their full quota of material cost. The amount of labor and overhead included in goods in process is reduced to the proportional estimate of one-half or an estimate of 50 per cent. Therefore the 10,000 boxes remaining in process were considered to represent 5,000 boxes in terms of completed products when computing labor and overhead cost valuation.

It is necessary to use the estimates of material, labor, and overhead cost as shown on the estimate cost card in evaluating the work in process inventory, since goods completed and transferred to Finished Goods were costed at estimated costs. Therefore all production, whether completed or remaining in process, is costed on the same basis. After the inventory of work in process has been computed, the amounts may be transferred from the three work in process accounts to a Work in Process Inventory account or, after the variance for each element of cost has been determined and transferred to variance accounts, the Materials in Process, Labor in Process, and Overhead in Process accounts may be ruled and the inventory value in each brought down as a debit balance to represent the beginning inventory for the ensuing accounting period. If a separate account, Work in Process Inventory, is debited and the three work in process accounts are credited for inventories, the account is a temporary account which is used for balance sheet purposes. At the beginning of the next period the account is closed, and the inventories are transferred to the three work in process accounts to constitute the opening inventory values.

Computation and Disposition of Variances. The balances remaining in the work in process accounts after inventories have been computed are the variances between actual and estimated costs for the period. The variances are of particular interest to management because they indicate the success with which the estimate cost system has been operated. Therefore it is advantageous to transfer the variances from work in process accounts to a separate variance account for each element of cost, *viz.*, Materials Variance, Labor Variance, and Overhead Variance. The variance accounts may have either debit or credit balances. Generally a debit balance indicates that actual costs have exceeded estimated costs and that production, whether it remains in process, in finished goods stockrooms, or has been sold during the period, has been costed below the actual production costs. A credit balance in a variance account generally is indicative that estimates used in costing production have been greater than actual costs and that work in process inventory, finished goods inventory, and cost of goods sold have been costed at too high a figure.

A debit balance in a variance account can be disposed of by one of the three following methods, the choice depending upon the cause for the existence of the variance:

a. The estimates may have been incorrectly computed; therefore the variance should be apportioned to Work in Process Inventory, Finished Goods, and Cost of Goods Sold.

b. The variance may exist because of seasonal conditions of actual costs and/or production, owing to the fact that estimate costs have been set as normal costs to cover a complete cycle of business activity, usually a year. The variance should be treated as a deferred charge to operations pending its absorption during subsequent accounting periods.

c. The variance may have been caused by abnormal conditions which are beyond the control of factory management; the proper disposition of such a variance is to transfer it either to Profit and Loss or to Surplus.

In accordance with the first method, when cost estimates are deemed to be incorrectly computed, it is necessary to credit the variance accounts and to debit Work in Process Inventory, Finished Goods, and Cost of Goods Sold with the share of the total cost of production remaining in each stage of completion or sale. Generally it is more convenient to reduce the amount of the variance to a percentage of error and then to apply the percentage to the production for the period. The formula for the computation of the percentage of error is as follows:

$$\frac{\text{Variance (material or labor or overhead)}}{\underset{\text{(estimated value)}}{\text{Cost of completed production}} + \underset{\text{(estimated value)}}{\text{end inventory of work in process}}}$$

The percentage of error for each element of cost, materials, labor, and overhead, is applied to Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold, which results in the restatement of each in terms of actual costs. The journal entry required to close variance accounts is as follows:

Work in Process Inventory	xxx	
Finished Goods	xxx	
Cost of Goods Sold	xxx	
Materials Variance		xxx
Labor Variance		xxx
Overhead Variance		xxx

The percentages of error are applied to the schedule of cost estimates, and a revised estimate is computed for use during the next accounting period.

The estimate cost system may be planned so that estimates are prepared for a single month or quarter. If this plan is followed, there will be no seasonal conditions of cost or production to consider. However, if estimates are considered to be normal amounts and the estimates are set for a year composed of 4 to 12 separate accounting periods, variances between estimates and actual costs may arise at the end of a month or quarter because of seasonal conditions of costs such as material costs, labor rates, repairs, power and light, and other overhead costs and seasonal conditions of productive activity. The estimates used during a month may be satisfactory when the normal period of operation is considered, but cost conditions of the particular month may be higher than those of other months, a condition which will be offset by counterbalancing conditions during the remaining months of the normal period. The variance between estimated and actual costs may result because production was low during the month, a condition which will be rectified by large production in other months. If the variances are attributed to seasonal factors, the variance accounts should remain open in the ledger and should be treated as deferred charges in the balance sheet for a month or quarter. An alternative is to consolidate the variances in a special account, such as Variances from Estimated Cost, which would be treated as a deferred charge on the balance sheet.

Unusual or abnormal circumstances which necessitate the transfer of variances to Profit and Loss or to Surplus are illustrated by strikes, lockouts, fire, theft, and wind or water damage, not covered by insurance. Such cost conditions are beyond the control of the management and should not be included as a production cost element.

Variance accounts with credit balances indicate that the estimates of production costs exceed the actual costs for the period. They may be disposed of as follows:

a. The estimates may have been incorrectly computed; therefore the variances should be used to reduce the value of Work in Process Inventory, Finished Goods, and Cost of Goods Sold.

b. The variances may exist because of seasonal conditions of actual costs and/or production; the proper treatment, monthly or quarterly, is to show the variances as deferred credits on the equity side of the balance sheet.

Use of a Separate Work in Process Account for Each Production Department. A variation of the method of estimate cost accounting explained above is obtained in the third method, which consists of using a separate work in process account for each production department or operation. This plan calls for the use of estimate costs in connection with the process cost or operation cost systems.

The general plan can be outlined as follows:

a. Estimates of material cost, labor cost, and overhead are made for each product for each production department.

b. An account is used for each production department as a medium for costing work in process.

c. The work in process account for each department is charged for the total actual cost of material, labor, and overhead cost applicable to production for the period and is credited for the estimated cost of goods completed which is transferred to Finished Goods.

d. A physical inventory of work in process in each department is taken at estimated costs and is either transferred to a Work in Process Inventory account or is used as the opening balance of inventory in the department account at the beginning of the next accounting period.

e. The balance remaining in each department account is the variance between estimated and actual costs of the department. The variance is transferred to a variance account for the department.

f. The variance for each department is prorated over the inventory of work in process for the department, Finished Goods and Cost of Goods Sold; treated as a deferred item; or closed to Profit and Loss or to Surplus.

g. The estimates of material cost, labor cost, and overhead for each department are revised for use during the next accounting period.

Exhibit 90 is a diagram showing graphically the accounting procedure when a separate work in process account is used for each production department.

Other Methods of Accounting for Estimate Costs. Other methods of accounting for estimate costs include:

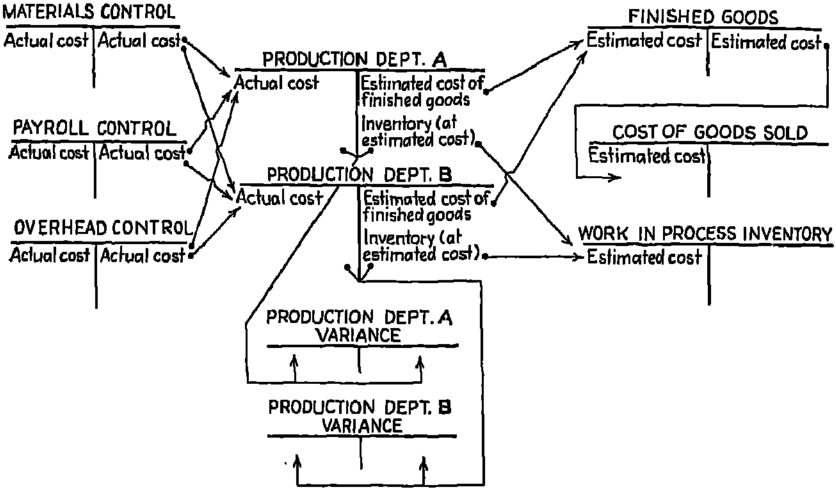
a. Use of a single work in process account for all elements of inventory, the account being charged for actual costs and credited for the estimated costs of production. This method has the disadvantage of showing the variance as a total figure rather than by separate cost elements.

b. Variation of the third method explained above in the form of a separate work in process account for each element of cost, materials, labor, and overhead, for each production department. Therefore if there are 10 production departments, 30 Work in Process accounts are needed. While this method produces complete information concerning both elements of cost and departments, it involves the use of too many accounts in concerns which have many departments.

c. Use of a separate work in process account for each product manufactured. Each work in process account is charged for the actual cost and is credited for the estimated cost of production of a product during the period. If a large number of products or a number of similar products of varying styles and sizes are manufactured, complications result because of the number of accounts involved.

Exhibit 90

Diagram of the Flow of Accounting Entries when a Separate Work in Process Account is Used for Each Production Department in an Estimate Cost System



Advantages and Weaknesses of Estimate Costs. Estimate costs can be used successfully in business enterprises in which a relatively few standard or uniform products are produced, a small number of processes are necessary, and the cost elements are uninvolved. The methods employed do produce estimates of material, labor, overhead, and total costs for each product, which are valuable in preparing bids for prospective business, in formulating price policies and price lists, and in planning for personnel and production for the ensuing period. The majority of estimate cost plans are operated as abbreviated accounting systems, with no production orders being used as daily records of actual cost. Actual costs are accumulated as totals in the general ledger at the end of the accounting period when comparisons are made with the estimates of costs. The elimination of production orders as subsidiary records to work in process results in a saving in clerical work and so reduces the cost of cost accounting. A final advantage that can be attributed to the use of estimate costs is that it frequently makes apparent to management the need for a more scientific form of cost control and may be the forerunner of standard costs.

It must be conceded that the attempt to predict actual costs, which is the fundamental purpose underlying estimate cost accounting, sometimes produces the negative result of keeping management unaware of the waste of material, the inefficient use of labor, and unnecessary overhead costs. It is better to forecast what the costs *should* be rather than what they *will* be.

CHAPTER XVI

STANDARD COSTS: GENERAL PRINCIPLES; STANDARDS FOR MATERIAL, LABOR, AND OVERHEAD

The use of standards is not a newly created device. For many years the underlying principles of standard costs have been a part of the efficiency plans of production engineers, especially in setting piece-rates through the aid of time and motion studies. Sales quotas, advertising appropriations, and allotments for various classes of costs may be classed as types of standards which have been used to measure efficiency in the sales and administrative divisions of many concerns. Cost accountants have used methods akin to standards in the job order cost accounting system in the development of a normal overhead application rate or departmental rates for the purpose of avoiding seasonal fluctuations in actual overhead and production conditions in the allocation of overhead costs to production. The new era of popularity of standard costs has been due to the success with which standardization has been applied to all elements of a business.

Standard costs are not distinct systems of accounting. They may be used either with the process or operation type, or with the job order type of cost accounting system. They may be developed for the sales and administrative division, for materials, labor, or overhead or for all elements of cost. The value of the system usually increases as more costs are standardized.

Defects in Actual Cost Methods from Point of View of Management. From the point of view of management, there are three important defects in the older types of cost analysis: the importance attributed to actual costs, the historical aspect of the cost figures, and the high cost of compiling actual costs. Management is led to believe that actual costs are the result of efficient operation, when in reality actual costs may include excessive quantities of material, defective parts, ineffective use of labor, and an unnecessary amount of time in production. In other words, the cost analysis may not be an indicator of efficient plant operation. In addition to actual costs, management needs a means of appraising or measuring the efficiency with which materials, labor, and overhead costs are combined in the finished product. A means of measuring efficiency is found in the form of standards. Historical costs are a material aid to plant management, but, in many industries where price lists, bids, and production plans must be formulated far in advance of actual production, historical costs are obtained too late to be of maximum value. Therefore predetermined standard material, labor, and overhead costs are an important aid in formulating price policies, in planning production, and in measuring operating efficiency.

The older types of cost systems entail the use of subsidiary records which may be voluminous and may require the time of a large number of clerks. The cost of operating such systems may be too great for many business enterprises which welcome a reduction in the cost of cost accounting frequently made possible by the introduction of a system of standard costs.

Differences between Estimate and Standard Costs. The technique for determining estimate costs and standard costs is similar, and the accounting procedures employed for the two are comparable, but the objectives are entirely different. In estimate cost plans the emphasis is on actual costs which are deemed to be the correct costs. The success of the estimates is measured by the degree to which estimated costs coincide with actual costs when a comparison is made at the end of the accounting period. If the estimates of cost correspond exactly with actual costs, they are considered to be properly devised. If the estimates are higher or lower than actual costs, they are revised for use during the next period. The revisions are made in accordance with actual cost experience during the period and with changes in actual cost conditions which are expected to prevail during the next accounting period.

When standard cost plans are used, the emphasis is on what costs of material, labor, and overhead *should be* if the plant is operated as a highly efficient unit with each supervisor, workman, and machine functioning as an efficient part of the productive process. The standards which are determined at the beginning of the period are used as a barometer of efficiency. Actual costs are compared with the standards periodically so that the efficiency of production may be determined. The emphasis is on the standard cost; actual costs are accumulated primarily to make possible their comparison with the standard costs. Standards are not revised unless they have been incorrectly set; the too frequent revision of standards would make them unreliable as a basis for comparison.

Disagreement as to Meaning of Standards. Readers of current texts and of magazine articles are frequently confused by the lack of agreement as to the meaning of standards and the methods used in their determination. The disagreement may be attributed in part to the recent origin of this new managerial device and in part because the objectives of management may differ with the individual concern. The following statements, epitomized from current books and periodicals, illustrate the existing confusion as to the meaning of standards and show the need for uniform methods in their determination.

a. Standards represent ideal conditions of productive activity.

b. Standards are a forecast of what costs should be under normal operating conditions.

c. Standards are representative of average cost conditions.

d. Standards are predetermined costs representing budget forecasts of expected production and costs.

e. Standards are a reasonably attainable expectation of conditions of plant operation.

f. Standards are replacement costs computed at the latest market or replacement value.

Ideal operating conditions are not an effective goal to set for either executives or employees since the ideal can seldom, if ever, be realized. Every business enterprise encounters the human element in the employment of labor, and, even in the most accurately constructed machines, there are imperfections which result in waste in materials, spoiled work, idle labor time, and idle machines. The operation of a plant according to 100 per cent efficiency is impossible, and to set standards at a point which cannot possibly be attained offers little incentive to employees. A goal, to be effective, must be reasonable and attainable.

The concept of standard costs as normal costs offers many practical difficulties and does not set up the proper incentives to the plant personnel. The term "normal" is loosely used and indeterminable. Normal may be operating conditions of the past year, of the best year the enterprise has experienced, or of a year deemed typical of the growth of the firm, but regardless of the period of time considered as normal, it may be said with assurance that there will never be a single period of time that will parallel it in production activity or in costs of operation. The average businessman notes certain peculiarities about his business among which are the lack of uniformity and the unforeseen changes. Normal conditions are unknown to the majority of enterprises. A second reason for not using a normal cost as a standard is that normal operating conditions generally include many forms of inefficiency in the employment of workers and in the use of plant; the elimination of these forms of inefficiency is the result desired by management when standards are adopted.

Obviously, average costs are not to be considered as standards. Average costs may cover a multiplicity of business errors, such as waste, poor planning, faulty fabrication, and idle time, none of which will be uncovered unless a higher goal is attained in setting the standards.

Budgets are estimates or forecasts of what costs are expected to be after a careful analysis has been made of past costs, present costs, and future conditions, but the emphasis is on the actual costs which will exist if present operating methods are continued. No attempt is made to change conditions or to show what costs should be if the plant were to be operated on a highly efficient basis. Budgeting is an important aid in setting price standards, but budget costs are not true standard costs.

Standards should be reasonably attainable expectations of conditions within a plant, but the expression is so vague that it would be difficult to know at what point above actual costs and below ideal costs the standards should be set.

Obviously, replacement costs are not standards of efficiency from any point of view, although price standards for material, labor, and some overhead costs tend to reflect the prices which are expected to prevail during the budget period. Thus, in discussing price standards, there is some justification in referring to them as replacement costs if future market prices are what "replacement costs" are considered to signify.

Definition of Standard Costs. Out of this maze of conflicting concepts may be extracted the important principles that standards are predetermined costs which are used in measuring productive efficiency and which are used periodically as a basis for comparison with actual costs. Standard costs are not permanent costs and are subject to revision from time to time. They may be characterized as "common-sense costs"; figures which reflect the best judgment of management as to what costs ought to be if the plant were operated with a high degree of efficiency with the standards for material, labor, and overhead set so as to be possible of attainment. A definition will be ventured.

The standard cost of a product may be defined *as predetermined costs, based upon engineering specifications and representing highly efficient production for quantity standards and forecasts of future market trends for price standards, with a fixed amo*[illegible] *and overhead for an estimated* [illegible] *of production.* The [illegible] thing that should be noted, before a detailed analysis can be made of the proper method of determining standards, is that there are two groups of standards: price standards and quantity standards, and for each element of cost, whether material or labor or overhead, the "variance" between standard and actual at the end of each accounting period is explained by both quantity and price differences. Engineering specifications are the basis for quantity standards for material and for time standards for labor, while budget forecasts are of primary importance in determining material price standards, labor rate standards, and overhead standards. The estimated quantity of production for the period must be considered since it is an important factor in determining the standard overhead rate for the period. Standards are generally detailed to show estimates for each element of cost, for each production center, for each operation, and, in some enterprises, for each machine.

The determination of price standards is predicated on the ideas that market prices for materials, labor, and indirect services classed as overhead can be forecasted for the ensuing period and that the required quantities of these requirements can also be foretold. Therefore carefully prepared budgets form a necessary element in the preparation of such standards. The determination of quantity and time standards is largely an engineering problem in which budgets are of value only indirectly in that they supply estimates of the quantity of goods expected to be produced.

Advantages of Standard Costs. Among the many advantages generally attributed to the use of standard costs, the most important may be stated as follows:

a. Standard costs are a valuable aid to management in formulating price and production policies.

b. Quantity and time standards are a constant unit of measurement by which management is enabled to gauge the operating efficiency of employees and of production centers during different periods of time.

c. Standards make possible the application of the "principle of exception," which means that the attention of management is centered primarily on cases of below- and above-standard performance.

d. Standards are important as incentives to workers, supervisors, and executives.

e. Standards are an economical means of cost accounting and generally result in a saving in the cost of cost accounting.

Value of Standards in Formulating Price and Production Policies. In mass-production plants which produce quantities of standard and uniform products, standard costs for material, labor, and overhead are determined in advance of the accounting period. In production order plants, standards are computed in advance of the accounting period for parts and processes which are uniform before production is started for products fabricated according to special specifications. In either case, standard costs are predetermined costs which are a material aid to management in determining price policies, preparing bids for prospective orders, planning production of new products and new styles, and furnishing cost estimates, all of which enable the sales department to push lines of products with the greatest margin of profit. The file of standard cost cards constitutes an excellent source of reference for both major and minor executives.

Standards as a Constant and Unchanging Unit of Measurement. The older forms of cost systems provide actual costs of a particular accounting period which are compared by executives with reports of costs of past periods; the cost differences between periods are the only means management has for comparing the efficiency of plant operations. There is no unit of measure, no constant base to which a period's costs can be compared and by which their operating efficiency can be judged.

When a standard cost system is in use, standards of material quantities, labor time, and machine time are set for each product, each production center, and each machine. If the standards are correctly determined, they may exist without revision from year to year, bridging accounting periods and making possible the comparison of the actual costs of each period with standards so that the efficiency of each worker and production center may be appraised. Quantity and time standards need never be revised unless there are changes in the products, methods of production, machines, type of labor, or quality of materials used. Thus such standards provide a constant and unchanging unit of measurement. Price standards, however, are subject to periodic revision. Generally, standards of all types should be used for the longest period possible in order that executives, whose duty it is to prepare reports and to analyze costs, may not be confused and may have a better basis of comparison.

Principle of Exception. In large plants or in manufacturing divisions which have a large number of workers and operations, it is difficult for executives and supervisors to analyze and weigh the efficiency and productivity of individual workers and machines. Management has come to realize the economy of both supervisory time and effort in the use of the "principle of exception," which is considered to be an important advantage of standard cost systems. The principle of exception assumes that actual performance which meets the standard time or rate is satisfactory and that only those activities which fail to come up to standard or which exceed standard are worthy of executive attention. Thus the attention of management may be focused on important cases of exception from standards; operations which meet standard or which approach standard performance so closely that the variances are negligible may be ignored. Daily reports of labor and materials can be so arranged that the foreman of each production center and the supervisor of each department can see off-standard conditions and can investigate excessive costs before they have continued for any length of time.

Standards as Incentives to Personnel. If standards are reasonable and possible of attainment, they act as incentives to employees to increase their volume of production and to maintain the quality of the product. Each worker undertakes his assignment with advance knowledge of the standards set for the particular job; he knows that, if his work falls short of the standard, he must account to his supervisor or foreman for the variance and give a reasonable explanation for its existence. Unquestionably workers tend to work more efficiently, supervisors and foremen have a greater interest in the accomplishments of their departments or operations, and executives analyze more closely the productivity of their divisions when standards are used as a means of measuring the results of the activity of each employee and division.

Many plans for rewarding workers, supervisors, and executives for equaling or surpassing standard performance are in use. Cash bonuses, prizes, vacation time, and promotions are among the methods of reward frequently employed. If workers are to be penalized or criticized for below standard work, it is essential that they should be given a suitable recompense when standards are equaled and passed.

Standard Costs an Economical Means of Costing. The principal means by which the use of standards can often save clerical and accounting cost and managerial time have been ably described as follows[1]:

1. By carrying inventories at standard cost, stock ledgers can be kept in terms of quantities only. This eliminates much clerical effort in pricing and balancing items on stock ledger cards. Total standard cost of goods on hand can readily be obtained at any time by multiplying the quantity in stock by the standard unit cost. If average actual cost is wanted, it can be computed by multiplying standard cost by the ratio between actual and standard cost of the goods.
2. When standard costs are used, requisitions or bills of material for materials to be put into production can be written and priced more rapidly than when the goods must be priced at actual cost.
3. The standard cost of goods finished can be obtained immediately upon

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[1] "A Reexamination of Standard Costs," Research Series No. 11, *National Association of Cost Accountants Bulletin*, Feb. 1, 1948, p. 720.

completion since it is necessary only to multiply the quantity by the unit standard cost. Simple and economical process costing methods can be used in place of elaborate job costing methods.

4. The time required to prepare reports which are used by management can be reduced. Since most reports are useful in proportion to their timeliness, the managerial value of accounting is considerably enhanced.

5. The time devoted by management to study and interpretation of cost reports is much reduced when standard costs are used. These economies result from elimination of all details except those requiring attention and from the provision of standard figures which facilitate comparison and interpretation of actual costs.

6. The time required to assemble cost data for budget preparation or pricing studies is reduced because it is not necessary to devote so much time to the analysis and rearrangement of past actual costs.

Standards and Accounting. Standards for material, labor, and overhead may be purely statistical devices used by management as predetermined cost information without their ever being compared with actual operating costs. Some concerns use standards exclusively in this manner without employing any form of historical cost system to test the correctness and adequacy of the standards. Such methods may be criticized as being unreliable, unsound, and misleading as management tools. It is only when standards are used in connection with a reliable historical cost accounting system that an effective control of costs is created.

Standard costs may be employed in connection with either the process cost or the job order type of cost system. The former is more generally used because standards have been more readily adaptable in mass-production plants with an output of quantities of uniform and standardized products or of parts for which standards may be set in advance of the accounting period. The process cost system accumulates total material, labor, and overhead costs at the end of each accounting period for each department, operation, or product so that a comparison can be made between total standard costs and actual costs. The process cost system is relatively inexpensive to install and to operate, and, when standards are used in connection with it, the most inexpensive form of standard cost accounting results.

Special-order industries may also use standards in connection with a system of job order cost accounting although such enterprises generally encounter a higher cost in preparing standards which must be formulated or revised to fit the needs of each new type of production or job. The daily accumulation of actual costs on production orders is an expensive process, so that the use of standards in conjunction with job order cost accounting may entail too great a cost for some enterprises. However, the results of such a combination are frequently so effective an aid to management that its value is greatly out of proportion to its cost.

Budgets and Standards. Standards have been ably discussed from both a managerial and an accounting point of view in current books and periodicals, but one important consideration has not been given adequate attention. The part that budgets and systems of budgetary control play in the development and operation of standards is important enough to deserve careful consideration. In fact, the statement can safely be made that budgeting must precede the accurate and effective determination of price standards for material, labor, and overhead and that, conversely, a plan of budgetary control is more successfully installed in concerns having standardized production processes and operating under standard cost accounting systems. Budgetary control and standard costs are inseparable, and each is an important adjunct to managerial planning.

Organization of the Plant. Before a standard cost system can be operated efficiently, it is necessary that the plant be so organized that lines of authority are properly defined and departmentalization is clearly designated. Each worker should be informed, by means of standard cost cards, charts, or blackboard reports, of the quantity of material and labor time set as standards for his particular operations so that he may be held responsible for off-standard results. If groups of workers are responsible for a single operation or process, the group should be made responsible for below-standard production. The foreman of each group of operations or workers is responsible for efficient production, and he must explain off-standard results to his immediate superior, who is usually a department executive. Thus the superintendent of the plant, the department executives, the foremen, and the workers are all held responsible for excessive use, waste, and spoilage of materials, for idle time and labor time in excess of standard, for unused machine and plant capacity, and for overhead in excess of standard budget requirements. Each person must achieve the standards set for the functions and responsibilities which have been assigned to him. The responsibility must be made absolute, as in an army organization, with mutual cooperation existing through the entire organization, from the superintendent to the lowest paid workers. The goal is efficient plant operation, which is signified by the attainment of standards. A series of daily or weekly records showing comparisons between standard and actual performance are the best means of informing executives and supervisors of the progress of plant operations so that they can advise and instruct workers in order to enable them to attain standard performance in their respective duties. Wall charts and blackboards are used successfully in some plants to supplement more formal reports.

Simplicity of organization, carefully defined cost centers, strict allocation of duties, and a system of reports are the prime factors in devising a suitable layout for the introduction of standard costs.

Engineering Specifications and Production Plans. The starting point in the preparation of material quantity and labor time standards is the careful analysis of the engineering specifications, mechanical drawings, and lists of parts used in the assembly of the product in question. A knowledge of quantity, type, and size of each class of material, of the nature of each labor and machine operation, and of the various types of assemblies can be secured to form the basis for the careful testing of material quantities and the making of time and motion studies required in determining standard costs. The advice and aid of employees in such technical departments as the various mechanical, electrical, and chemical engineering departments are invaluable in determining quantity and time standards.

Past Cost Records an Unreliable Factor in Determining Standards. Records of costs representing periods which predate the standard cost system should not be relied upon as a basis in determining standards, because they incorporate the inefficiencies and wastes that the standards are expected to uncover and to prevent or to minimize in the future. The records of past costs should be scrutinized only for the purpose of ascertaining the methods of production, the various operations, the record of defective parts, the waste of material, and the idle time which may be considered a normal condition of operation and which cannot be prevented. For example, in a woodworking shop a certain portion of material is waste regardless of the efficiency with which the mill is operated. A similar condition exists in the clothing industry, in which scrap materials result in spite of the care taken in designing and cutting. Waste that cannot be prevented is generally included as an element of cost in setting standards.

Standard Cost Cards. The file of standard cost cards or sheets constitutes an important part of the standard cost system since it is this record which is used by management in formulating price policies, preparing price lists, quoting special prices, planning production, and analyzing marketing possibilities. The type of standard cost card used varies with the requirements of the individual firm; hence no uniform form can be presented.

A card may be prepared for each product to show the quantity and price of each class of material required, the class of labor, the labor time and rate, the overhead time and rate, and the total of each element of cost for each operation or department. An alternative is to use a separate card for each part manufactured, with cards showing various assembly costs, so that the total standard cost of a product is obtained by adding together the costs on cards for parts and assemblies comprising the finished product.

Standard cost cards are frequently arranged in such form that they may be revised from time to time and that the revisions can be shown in columns adjoining the column containing the original standard estimates.

Standards for Materials—Quantity. In the case of materials the goal is to set a standard material cost per unit, a computation which involves a complete list of the material used and the standard quantity multiplied by the standard price of each part. Apparently writers have in mind quantity standards when they consider standards to be of a fixed and unchanging character. Material quantity standards are based upon engineering specifications, verified by chemical and mechanical analyses or by test runs. Drawings, blueprints, and designer's specifications may be used as the basis for obtaining a list of the parts, the weight of materials, and the quantity of each liquid to be included in the product. Mathematical calculations or chemical and mechanical analyses should be made for each part or process, and test runs of production should be made. Generally the procedure is repeated several times on different days for each product, and the results are compared so that unusual circumstances will not improperly color the computations. There are no budget elements involved in setting material quantity standards, and the problem is largely one of engineering rather than of management.

Standards for Materials—Price. The determination of price standards for material is a distinctly different problem, one which is based upon executive judgment and fortified by a system of budgetary control and forecasting. Material prices manifest wide and persistent fluctuations, even for standard products such as steel, copper, and lumber, and to use for period after period a standard price for materials which is above or below the actual market price seems to be a most confusing and unreliable barometer of costs.

A more practical solution to the problem of setting price standards for material is to consider the present prices of various grades of material, the economies realizable by quantity buying, and the probable market tendencies for a definite future period of time, in most cases for the budget period. The standard material prices should be changed at the beginning of each budget period to coincide with the estimated requirements and with the market conditions for the ensuing period, and the predetermined standards should remain in force for the entire period. The standards should be based upon the most efficient conditions of purchasing, transportation, and handling, but they should be possible of attainment.

The standard cost of material should include the price paid to the vendor after deducting both trade and purchase discounts, to which should be added freight charges, cartage, receiving and testing costs, insurance, and storage charges. While impractical in many concerns, it seems logical to include the cost of maintaining the purchasing department as a cost of materials. In other words, the price of the material should include all costs incurred up to the time the material is ready to be put into manufacturing processes.

Conditions vary in different companies, but two distinct groups of raw materials are usually purchased. One group includes semiprocessed or completed parts which are either further processed or are used in assemblies in the finishing departments. These parts are purchased according to standard specifications. They are contracted for some time in advance and usually are not susceptible to current market price changes. The production budget should exhibit the expected production of finished products, classified by units and classes of products for the budget period. These estimates, combined with the standard material requirements for each unit of the product, should give the purchasing department adequate information as to the quantity of each class of material needed for the budget period. The actual contract price per unit plus an estimated amount of freight, receiving, handling, storage, and purchasing cost should constitute the standard price of each unit of material for the period.

The preparation of standard prices presents greater difficulties in the case of materials in the second group, which includes standard raw materials bought in the open market and susceptible to almost daily fluctuations in market prices. It is frequently contended that standard prices for materials in this class should be built up by an analysis of the market for a past period covering at least one complete business cycle and that the average price of that period should be established as standard. Instead, a careful analysis should be made by the forecasting and purchasing departments of the existing market conditions and of the expected trend of market prices during the next budget period. It may be that a series of expected prices, either upward or downward, may be computed, in which case the average of the estimated net prices for each class of purchases should be established as a standard to which could be added the applied receiving, handling, and purchasing costs to obtain the final standard for the period. The standard price for each class of materials should be used without revision during the budget period unless market prices have changed appreciably.

Standards for Labor—Time. The problem in establishing standard labor costs is to develop, for each product manufactured, a standard cost sheet showing the standard time for each operation multiplied by the standard rate to be paid. The determination of efficient standards has attained a higher degree of success in the case of direct labor than in either material or overhead because of time and motion study methods, minute division of labor, and scientific wage schemes in manufacturing plants.

The most common method of setting time standards for labor is to use a stop watch in making time and motion studies of each operation required in the production of a part or of a product. The process is identical with the one followed in preparing time estimates in connection with an estimate cost system, except that, in computing standard time, the most efficient worker's time would be charted while in the case of estimate cost plans the average or typical worker's time would be used as a basis. The standard time for each operation should include any necessary waste motion and idle time, but, if it is to be a proper means of measuring productive activity, all forms of inefficiency in the use of the time factor must be eliminated.

Regardless of the method, the basis of determining labor time standards must be fair to both the employees and the company. The goal set should aim at maximum efficiency, but it should be reasonable and attainable. When a labor time standard is correctly set, it should remain in use until changes occur in the method of performing the operation or until the quality or time of labor used is changed. The setting of such standards has no budgeting requirements.

Test Runs as a Basis for Determination of Standard Costs in a Bakery. In some industries such as bakeries it has been found that suitable standards for material and labor operations can be determined without the use of detailed time study techniques through the use of the *test run procedure*. The methods used in setting standards in a large bakery are described as follows:[1]

> The principle of the test run is to provide a significant portion of the data for synthetic standards based also on combination of past performance and machine capacity. Upon scheduling a new item to be produced, the production superintendent determines the formula requirements as a first step. In other words the raw material specifications are pre-planned on a formula basis. Once established, no change in material requirements is to be made without authorization. The type and character of the product determine the type of die required and the machine on which it is to be made. Several types of cutters or dies are used for the several types of product and all of them are adaptable to the same baking operation. However, the baking method does differ with the materials used.
>
> It is necessary for the baking floor supervisor to determine the best rate of speed, baking time, and baking temperature required to produce the cookie. The number of direct labor operators is determined by the machine assignment. Many machines accommodate a number of types of dies and can produce a variety of products with the same labor complement. Since the baking operation is central to the entire manufacturing cycle, it can be understood readily that the most important of the test run procedures covers this phase of processing operations.
>
> **The Test Run Card Recaps Standards.** The test run procedure is best illustrated through the test run card shown as Exhibit 91 which embodies a coordinated record of information worked out to establish both material standards and baking operation standards. The card is divided into two parts. The left portion contains material specifications. The right portion contains operation data and specifications. All the information is coordinated to establish two basic standards. The first provides a standard material yield and the second establishes standard labor and machine productivity.
>
> A per cent-of-yield factor is applied to each material item to obtain a total standard yield expressed as a physical unit for the entire formula "batch." The operation data reflect a scheduled run under normal operating conditions and shows the total batch weight, with a process allowance for scrap and shrinkage and a net weight to the ovens. At this point a standard scrap quantity at the oven and packing table is established, based on the results of the test run on which the data are built.
>
> The operation standards consist of the basic elements for the machining process. As shown on the exhibit, these factors consist of "cakes per stroke," which is determined by the die or cutter used for that particular product, "strokes or

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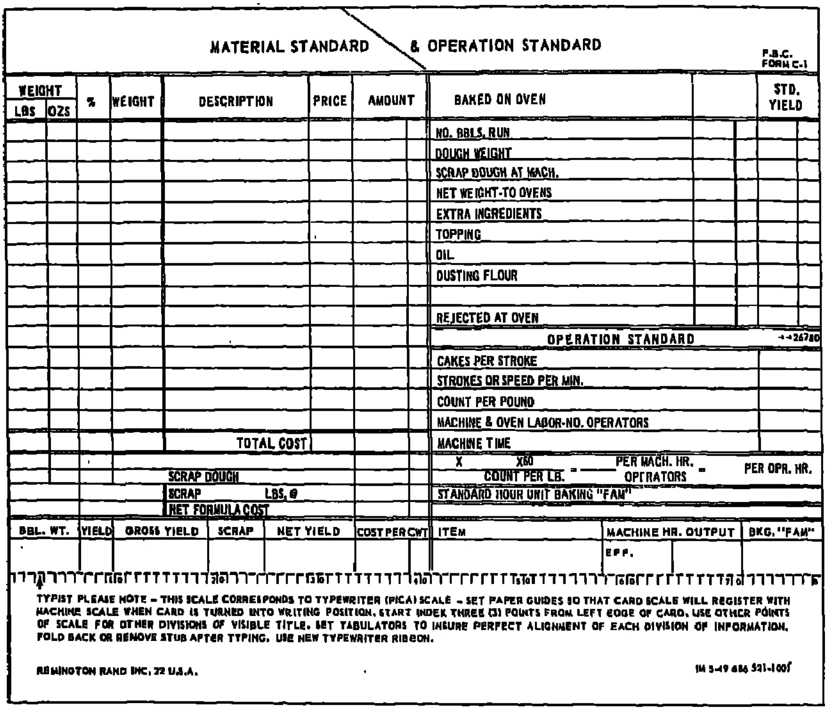
[1] ERNE, L. C., "Test Runs Supply Basis for Standard Costs in a Bakery Operation," *National Association of Cost Accountants Bulletin*, August, 1950, pp. 1487–1489.

speed per minute," which is determined by the nature of the product and the baking time required, "count per pound," which reflects the relation of the product as to size and weight, the number of direct labor operators assigned to the process, and machine time. A simple formula establishes the standard by computing the number of cakes produced on the machine and baked in the oven in one hour, converted to pounds by dividing by the number of cakes per pound. This result is the machine hour output expressed at one hundred per cent efficiency. In other words, if the stated speed were to be maintained for sixty minutes every hour, the total number of pounds produced should equal the output arrived at. A leveling allowance is made at 89 per cent to establish the machine hour output at an actual operating level.

EXHIBIT 91

TEST RUN CARD



MATERIAL STANDARD & OPERATION STANDARD

F.B.C. FORM C-1

WEIGHT LBS	WEIGHT OZS	%	WEIGHT	DESCRIPTION	PRICE	AMOUNT
				TOTAL COST		
				SCRAP DOUGH		
				SCRAP LBS. @		
				NET FORMULA COST		

BAKED ON OVEN		STD. YIELD
NO. BBLS. RUN		
DOUGH WEIGHT		
SCRAP DOUGH AT MACH.		
NET WEIGHT-TO OVENS		
EXTRA INGREDIENTS		
TOPPING		
OIL		
DUSTING FLOUR		
REJECTED AT OVEN		

OPERATION STANDARD 26780

CAKES PER STROKE

STROKES OR SPEED PER MIN.

COUNT PER POUND

MACHINE & OVEN LABOR-NO. OPERATORS

MACHINE TIME

X X60 / COUNT PER LB. = PER MACH. HR. / OPERATORS = PER OPR. HR.

STANDARD HOUR UNIT BAKING "FAM"

BBL. WT.	YIELD	GROSS YIELD	SCRAP	NET YIELD	COST PER CWT	ITEM	MACHINE HR. OUTPUT	BKG. "FAM"
							EFF.	

10 20 30 40 50 60 70

TYPIST PLEASE NOTE – THIS SCALE CORRESPONDS TO TYPEWRITER (PICA) SCALE – SET PAPER GUIDES SO THAT CARD SCALE WILL REGISTER WITH MACHINE SCALE WHEN CARD IS TURNED INTO WRITING POSITION. START INDEX THREE (3) POINTS FROM LEFT EDGE OF CARD. USE OTHER POINTS OF SCALE FOR OTHER DIVISIONS OF VISIBLE TITLE. SET TABULATORS TO INSURE PERFECT ALIGNMENT OF EACH DIVISION OF INFORMATION. FOLD BACK OR REMOVE STUB AFTER TYPING. USE NEW TYPEWRITER RIBBON.

REMINGTON RAND INC., 22 U.S.A. 1M 5-49 686 521-100f

The last step in the computation is to divide the machine hour output by the number of operators on the run to arrive at the output per operator hour. This in turn is converted to a standard hour unit which represents the part of an hour required to produce 100 pounds of finished product. Three test runs are usually scheduled by the production department for analysis by the cost department to establish the standard. During this time any irregularities should be corrected and process uncertainties removed so that the operation can be set up on a normal basis. Instructions are issued, requiring an authorization for any change either in respect to the formula specifications or the machining operation.

Standards for Labor—Price (Labor Rates). Unfortunately, a customary procedure in obtaining labor rates for use as standards has been either to select the rates paid during past periods for each class of labor or to set standards at a figure the management considered the rates should be. The standards obtained by either method are unreliable and inaccurate. Labor rates are prices determined in a competitive market in which the factors of supply and demand are usually active and are constantly changing in relationship to each other. If labor price standards are to be of any value to management as a guide to future operations and profits, they must adhere as closely as possible to the actual labor rates which will be in existence during the next period. In some industries, such as the clothing trades, wage rates are agreed upon for many months in advance by contracts between the unions and the management of the various companies. In cases where the wage rates are relatively fixed, the contract wage rate or the agreed-to piece-rates may be used as the standard for the period.

In other cases, however, wage rates are highly competitive and the labor market changes from month to month. In setting labor standards for this type of labor, a careful survey of the labor conditions within the company and in both local and national labor markets is necessary. The labor budget should show the labor requirements for each class of labor for the budget period. The conditions underlying each class of labor in the local market should be analyzed, and the expected changes should be charted or at least considered. The influence of the conditions prevailing in the national labor market upon the intercompany relations and local labor conditions should be considered. The forecasted wage rates should be set as the standard for the budget period. The standard rates, once determined, should be used without change for the period of the budget; any difference, more or less than standard, is considered as a variance. Labor price standards are best considered as budget estimates subject to revision at the end of each budget period.

Standard wage rates are determined in a different manner when piece-rates and bonus or premium plans are in use. When piece-rates are the means of compensation employed in a department, workers are paid a set rate per piece regardless of the quantity of production. Therefore the labor cost per piece or operation is a uniform amount, and the piece-rate becomes the standard labor price. When bonus or premium plans are in use as a means of compensating workers, the problem arises as to whether or not the extra compensation should be considered in setting the standard wage rate. If it is decided to include this element in the standard, the amount to be added must be determined by a study of bonuses and premiums paid during past periods and an average amount per labor operation must be computed.

Standards for Overhead. The preparation of standard rates for the allocation of overhead to production is more complex than is the development of either material or labor standards. Two distinct problems are involved: the estimation of the overhead components, such as indirect labor, supplies, depreciation, power, taxes, and rent, and the determination of estimates of production which form the basis for setting standard overhead rates. The preparation of both estimates is dependent upon an adequate system of budgetary control, and the use of budgets becomes more essential in the development of overhead standards than of either material or labor standards.

Of the three elements of cost, in the development of the older types of cost systems, standardization of overhead has received the most attention. Virtually, standards are employed as overhead application rates in concerns using carefully designed job order cost systems. If departmentalization has not been followed as a basis for the accumulation of overhead costs, the total overhead for the concern is estimated in the form of an overhead budget; the production for the period is budgeted for direct labor-hours, direct labor cost, or machine-hours; and the estimated overhead is divided by the estimated production, in terms of one of the three bases, to obtain an application rate which is used for the purpose of allocating overhead to production during the budget period. In departmentalized concerns the estimates of overhead are classified by service and production departments, and the service department estimates are reallocated to the production departments; the production expected from each production department is estimated; and the estimated overhead for each production department is divided by the estimated production of that department, expressed in terms of direct labor-hours, direct labor cost, or machine-hours, to obtain an overhead application rate for each department.

Thus, whether a single overhead rate or departmental rates are established through the use of budgets, the general procedure for establishing standard overhead rates is the same as that employed in computing predetermined overhead application rates under the job order cost system. However, the purpose or goal differs in the case of standards. In determining the standard rate, the budget estimates are subjected to careful analysis and are revised so as to constitute what overhead costs and production *should be*, while, under the job order cost plan, estimates which represent expected conditions of cost and production are used.

When enterprises are not departmentalized, the formula for the standard overhead rate is as follows:

$$\frac{\text{Standard overhead for budget period}}{\text{Standard direct labor-hours (or some other base) for budget period}} = \text{standard rate per direct labor-hour}$$

When enterprises are departmentalized, the formula for the standard overhead rate for each production department is as follows:

$$\frac{\text{Standard overhead for Dept. A for budget period}}{\text{Standard direct labor-hours (or some other base), Dept. A, for budget period}} = \text{standard rate, Dept. A, per direct labor-hour}$$

The problems involved in deriving standard overhead application rates are as follows:

a. Determination of what standard rates should represent.
b. Selection of a normal period of time and computation of normal rates.
c. Computation of the standard overhead costs.
d. Estimation of the production which represents standard.

What Standard Rates Should Represent. There is a variety of opinions concerning what should constitute the proper estimates of overhead and production in determination of standard rates.

The proper estimation of overhead in the development of standards is based upon overhead and production budgets. The standard overhead items should be established after proper investigation and survey of the present and expected costs for the budget period, and after consideration is given to the rate and amount of production for the period. It may be concluded that, for purposes of managerial control, it is logical to prepare the overhead estimates as standards in terms of the conditions to be expected during the period under consideration as shown in the manufacturing overhead budgets.

The other problem, the proper estimation of the amount and rate of production which forms the basis of setting overhead standard rates, may be formulated and solved after selecting one of the following possibilities:

a. The maximum theoretical capacity of the plant.

b. The maximum capacity of the plant, less allowances for normal idle time, vacations, and other ordinary operating interruptions.

c. Average or normal conditions of production, consideration being given to a past period, such as the last 5 years.

d. Estimated production, based on the sales expected for the budget period.

The fourth basis for the setting of the standard amount of production seems the most practical and useful. The present state of the market for the company products, the expected changes in market conditions of a seasonal nature or arising during periods of depression, expected changes in demand due to new styles or to the development of substitute products by competitors, and changing management policies should all be carefully considered in the forecasting of the expected volume of business at prevailing or expected sales prices for the budget period. The resulting estimates are usually reduced to such terms as direct labor-hours, direct labor costs, machine-hours, or units to be produced, with the further classification by production departments where departmental rates are desired. The standards set for production should be used during the budget period, and actual performance should be controlled so as to be brought into agreement with the standards.

Normal Standard Overhead Rates. It is generally recognized that it is unsound and inequitable to compute the standard overhead rate for a product in terms of the budgeted overhead cost or production for a single month, because the standard rate thus compiled is too high during months of inactivity and too low during periods of large production.

Therefore a normal standard rate for the application of overhead to a product is computed by dividing the total standard overhead for a normal budget period, such as a year, by the total standard production, in terms of direct labor-hours, machine-hours, or direct labor cost, for the same period of time. The normal standard overhead rates may be determined for the plant as a whole or by departments or operations, depending upon the degree of departmentalization which exists within the plant.

When a normal rate is used, variances between actual overhead and standard overhead may be attributed in part to either seasonal conditions of overhead or seasonal production. It is explained in Chap. XVIII that variances caused by seasonal conditions which have been provided for in the preparation of the normal rates should be carried as deferred items from month to month until the end of the budget period, because they are offset by counteracting cost and production conditions during other months.

Preparation of Standard Overhead Estimates. The numerator in the formula used to compute standard overhead rates is computed by means of a careful analysis and revision of the budget estimates of overhead for the period. If the concern is not a departmentalized organization, the general budget of overhead expected to be incurred during the budget period is the beginning point for the analysis. If the concern is departmentalized into service and production departments, the budget items must be classified and apportioned by departments; the service department estimates are subsequently reapportioned among the production departments.

Overhead estimates may be divided into the three major classes: fixed, semifixed, and variable. Fixed costs include those items which are not changed appreciably by increases or decreases in productive activity; semifixed costs vary to some extent with changes in production; and variable costs are composed of those items which vary directly in amount with changes in production. The costs in the second and third classes can be controlled, within certain limits, by management.

Each of the estimates of fixed costs should be carefully analyzed by executives to ascertain that they are correctly computed and are necessary to the operation of the enterprise. For example, the adequacy of the depreciation rates should be verified; the tax bills for past periods, the assessed valuation of the property, and the existing tax rates should be checked; the insurance and rental contracts should be inspected; and the executive payroll should be analyzed in order to determine whether all such costs are fixed and cannot be decreased without impairing the operating efficiency of the plant. The estimated fixed costs, as shown by the budget, constitute the standard cost for these particular items. Generally there is little or no variance between standard and actual costs of items in this group.

In determining standard costs for semifixed and variable items of overhead, the budget that contains the estimated overhead for each service and production department should be analyzed in the light of the expected production for the budget period. Each cost should be discussed with the department head involved, and an agreement should be reached as to the minimum amount that should be required without impairing the operating efficiency of the department. The standard amount set is what the item of cost *should be* rather than what it has been in the past or is anticipated to be for the next period. When the standard for each item of cost has been agreed upon, the standard amounts by items of cost are shown for each department on a standard overhead cost sheet which is used for the purpose of comparing standard and actual costs as the period progresses; the checkup is usually made monthly.

Instead of having a single standard overhead application rate for each production department, or for the concern as a whole if no departmentalization exists, it is possible to have two standard rates for each department. One rate is for the allocation of fixed costs; the other is for purposes of distributing the variable costs to production. Thus, for Dept. A, the following two formulas may be used:

$$\frac{\text{Standard fixed overhead for Dept. A for budget period}}{\text{Standard direct labor-hours for Dept. A for budget period}} = \text{standard rate for fixed costs for Dept. A}$$

$$\frac{\text{Standard variable overhead for Dept. A for budget period}}{\text{Standard direct labor-hours for Dept. A for budget period}} = \text{standard rate for variable costs for Dept. A}$$

The fixed standard rate plus the variable standard rate gives for the budget period the total standard overhead rate which is to be used in computing standard unit costs and in absorbing overhead as a manufacturing cost. Each foreman, supervisor, and department head should be informed of the standard rates for variable costs applied to production under his jurisdiction, and he should be given monthly reports to show how closely the actual variable overhead costs for his division conform with the standard variable overhead costs.

Standard Production. The correct standard for production, the denominator of the formulas used in computing the standard overhead rates, is more difficult to determine than is the standard overhead. The standard production should represent the estimated production based on the expected sales for the budget period, reduced to such common bases of allocation as direct labor-hours, direct labor cost, machine-hours, and units of production.

The starting point is the sales budget, which contains an estimate of the number of units of each type of product expected to be sold during the budget period. A production budget, based on the sales estimates, must be prepared to show the production expected of each department in order to comply with the sales requirements. The production budget should be supported by schedules showing the estimated number of direct labor-hours, estimated direct labor cost, or estimated machine-hours for each department required to complete the number of units of products recorded in the production budget.

If the plant is operated at a highly efficient level, the setting of the standard production for each department is largely a matter of determining the number of direct labor-hours, direct labor cost, or machine-hours which should be expended in completing the desired production. The decision is based upon information regarding productivity during past periods, and a forecast of what can be done during the budget period.

Flexible Budgets. The normal production of many manufacturing enterprises can be forecasted for periods of from 6 months to 1 year with a reasonable degree of accuracy. Consequently it is sufficient to have a single standard overhead application rate per direct labor-hour or a percentage of direct labor cost for concerns not departmentalized and a single rate for each production department in a departmentalized organization. There are some enterprises for which it is impossible to predict the volume of production for more than a few weeks or months in advance of actual scheduling of work. In such cases the determination of standard overhead application rates presents a problem, because a single rate for the factory or a rate for each department which will represent one of several volumes of production cannot be computed. It is possible to meet this difficulty by preparing a flexible budget which will show estimates of the overhead required to operate the plant at various levels of productive activity. Estimates of production in terms of such a base as direct labor-hours or direct labor cost can be prepared within certain limits, an upper limit representing the maximum capacity of plant operation and the lower limit the minimum capacity below which operations are not expected to fall. Between these two extremes one or more levels of possible production may be designated, one of which may be deemed normal. The estimation of the amount of each overhead item and of the total overhead which will be required for each volume of production is a managerial problem.

Exhibit 92 is a schedule of standard overhead, standard direct labor-hours, and standard overhead application rates for various volumes of production for a small factory which is not departmentalized. The schedule shows the computation of a standard overhead rate for each of five levels of production. The standard rate for each volume of production is computed by dividing the total standard overhead by the standard direct labor-hours for that volume of production. Thus the $0.40-an-hour standard rate for 100 per cent of normal production is obtained by dividing the standard overhead of $4,000 by the normal production of 10,000 hr. Each rate is computed in a like manner, with the result that the standard rates per hour tend to decrease with an increase in production and tend to increase as production decreases in volume. This condition is generally true because of the existence of fixed costs which do not vary and of semifixed charges which vary only to a small degree with an increase or decrease in production volume.

When flexible budgets are prepared with standard rates adjusted to volume of production, it is possible to determine standard rates of the year's production for each month in advance and to use each month the standard overhead rate which most accurately typifies the conditions of production for the month.

EXHIBIT 92

STANDARD OVERHEAD, STANDARD PRODUCTION, AND STANDARD OVERHEAD RATES FOR VARIOUS VOLUMES OF PRODUCTIVE ACTIVITY

Normal production: 10,000 standard hours Month: January

Standard overhead rate	$0.47	$0.44	$0.40	$0.38	$0.36
Standard direct labor-hours	8,000	9,000	10,000	11,000	12,000
Percentage of normal production, per cent	80	90	100	110	120
Fixed costs:					
Executive salaries	$ 600	$ 600	$ 600	$ 600	$ 600
Rent	200	200	200	200	200
Depreciation of machinery	300	300	300	300	300
Insurance	50	50	50	50	50
Taxes	75	75	75	75	75
Total fixed costs	$1,225	$1,225	$1,225	$1,225	$1,225
Semifixed costs:					
Supervisory salaries	$ 750	$ 800	$ 800	$ 800	$ 875
Clerical salaries	285	300	300	300	350
Light and heat	75	80	80	80	85
Building service	45	50	50	50	50
Total semifixed costs	$1,155	$1,230	$1,230	$1,230	$1,360
Variable costs:					
Indirect labor	$ 700	$ 780	$ 800	$ 900	$ 900
Factory supplies	200	220	225	235	235
Office supplies	70	75	75	80	80
Plant maintenance	140	145	150	160	160
Repairs	100	105	110	120	120
Spoiled and defective work	80	85	85	100	105
Power	90	95	100	130	135
Total variable costs	$1,380	$1,505	$1,545	$1,725	$1,735
Total costs	$3,760	$3,960	$4,000	$4,180	$4,320

Revision of Standards. Accountants differ widely in their opinions concerning the revision of standards. One group contends that, if a standard is revised during an accounting period, the changing of the "yardstick" destroys the means of measuring efficiency and that, even if errors are disclosed, the revision of the standards should be delayed until the end of the accounting period. A second group insists that a standard should be changed immediately after it is found to be in error, since an incorrect standard may affect adversely the initiative and incentive of the workers and executives involved.

A middle ground is favored for practical reasons. No change in quantity standards for material need be made unless there is a change in the type of material, quality of material, or method of production; unless, of course, an error was made in setting the original standard. Two successive purchases of material may contain slightly different grades or quality, which may cause a slight variance in material consumption. It would be impractical to change the material quantity standard, because later purchases may be made of the material originally tested when the standard was determined. Similarly, slight changes are constantly being made in labor and in machine operations which may cause a small variance between standards and actual results.

In every factory, management and technicians are constantly striving to improve methods and to bring about technological changes. When important changes in machine or labor operations or materials of different quality or type are used, standards should be changed immediately. Both price standards for material and labor rates should be revised when there are important changes in market prices for material and labor. Every standard cost system should be subjected to periodic review so that standards may be revised when they are incorrectly set or become outdated in terms of production methods. An alert cost department may be constantly adjusting and revising cost standards in order that standards will not be misleading to management. Changes may be made in specific standards without disrupting the entire standard cost system.

CHAPTER XVII

ACCOUNTING FOR STANDARD MANUFACTURING COSTS

A variety of methods of accounting for standard costs are in use at the present time. The lack of uniformity of method is in part because standards are a recent managerial device and in part because standards are superimposed upon existing cost systems which have been adapted to the needs of the individual concern.

Standard Cost Accounting Procedure. The following methods of accounting for standard costs may be considered the most representative of the various types in use:

I. Charge work in process accounts with actual costs and credit with standard costs, variances being derived at the end of each accounting period.

II. Charge work in process accounts with standard costs, credit with standard costs, and compute variances prior to entries in work in process accounts.

III. Incorporation of standard costs in subsidiary records only; standard cost data are omitted from general ledger accounts or included as memorandum information for statistical purposes.

The first two accounting procedures are generally used in connection with process or operation cost methods in mass-production plants which fabricate uniform products according to standard specifications. The third method is employed to the best advantage in special-order plants in which production orders are used to accumulate costs for each job.

METHOD I: CHARGE WORK IN PROCESS WITH ACTUAL COSTS AND CREDIT WITH STANDARD COSTS

This method is favored because of its simplicity and the minimum day-to-day accounting which is required. It is limited as an aid to management because the effectiveness of standards cannot be tested until the end of each accounting period, when a comparison can be made between actual and standard costs and when variances can be computed.

The accounting procedure varies to some extent depending upon whether or not an enterprise is departmentalized. Two plans of standard cost accounting for mass-production plants using the process type of cost system are explained under the following classifications:

a. The use of three accounts, one each for Materials in Process, Labor in Process, and Overhead in Process, in enterprises which are not departmentalized.

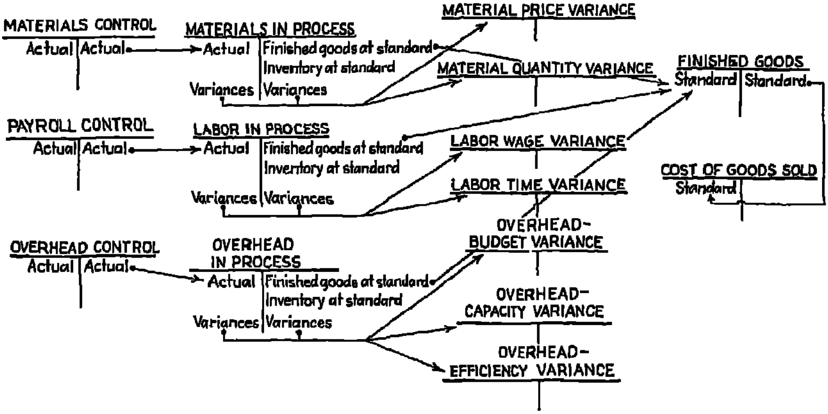
b. The use of a single work in process account for each production department or operation in departmentalized concerns.

ACCOUNTING PROCEDURE FOR CONCERNS NOT DEPARTMENTALIZED—METHOD I

The accounting procedure required for enterprises not departmentalized in which three work in process accounts are used is shown below in outline form, and graphically as Exhibit 93. The plan is illustrated in detail through the medium of a problem with an accompanying solution. An explanation of the salient features of the diagram and problem is given in sections which follow.

Exhibit 93

Diagram of Standard Cost Accounting Procedure when Work in Process Accounts for Materials, Labor, and Overhead are Charged for Actual and Credited for Standard Costs in Enterprises not Departmentalized (Method I)



General Accounting Plan. The general accounting program followed in the application of the plan may be outlined as follows:

a. The preparation of standards for material, labor, and overhead for each product in advance of the accounting period.

b. The use of standard costs in costing all work completed during the accounting period; the work in process accounts are credited and Finished Goods is debited at standard.

c. Transfer of the standard cost of goods sold from Finished Goods to Cost of Goods Sold.

d. During the accounting period, the recording of actual material cost in a Materials Control account, actual labor costs in a Payroll Control account, and actual overhead items in an Overhead Control account.

e. At the end of each accounting period, the transfer of actual cost of direct materials consumed, the total direct payroll cost, and actual overhead costs to work in process accounts.

f. As a function of the closing process, the computation of the value of work remaining in process at standard cost and the transfer of the inventory value to a Work in Process Inventory account.

g. The computation of the variances representing the differences between standard and actual costs and the transfer of the variances to separate variance accounts. This transfer closes the work in process accounts.

h. The analysis and disposition of each variance account.

i. Transfer of work in process inventories from the Work in Process Inventory account to the original work in process accounts as opening inventory balances for the next accounting period.

j. Revision of standards which have been incorrectly computed.

Illustrative Standard Cost Problem

The Glasco Manufacturing Co. produces a single standard product termed Glasco. The enterprise is small without a departmentalized factory organization.

The standard overhead costs for January according to the overhead cost budget are $2,000; the standard production for the month is 4,000 direct labor-hours, based on the production budget. The standard cost card for the product Glasco is as follows:

Standard Cost Card
Product: Glasco Jan. 1, 19__

Materials:	
20 pieces of x @ $0.40	$ 8
Labor:	
10 hr. @ $1.20	12
Overhead:	
10 hr. @ $0.50	5
Standard cost per unit	$25
Selling price per unit	$30

The following transactions occurred during the month of January:

1. Purchases according to purchase orders:	
10,000 pieces of x @ $0.45	$4,500
Supplies	600
Total	$5,100
2. Materials and supplies consumed per requisitions at actual:	
9,100 pieces of x @ $0.45	$4,095
Supplies	500
Total	$4,595
3. Labor cost per payrolls:	
Direct labor, 4,300 hr. @ $1.22	$5,246
Salaries (indirect payroll)	700
Total	$5,946
4. Overhead costs per vouchers:	
Rent	$ 200
Repairs	50
Power, light, and heat	175
Total	$ 425
5. Overhead costs per monthly adjustments:	
Depreciation of machinery and equipment	$ 100
Insurance	25
Taxes	50
Total	$ 175

6. Production completed during January:
   400 units.
7. Work in process inventory, Jan. 31:
   50 units; all material is consumed at beginning of production; production estimated to be one-half completed for direct labor and overhead.
8. Sales for January on account:
   350 units @ $30 .... $10,500

Prepare journal entries to record the transactions for January; work in process accounts are to be charged for actual costs and credited for standard costs, variances being transferred to separate variance accounts.

Solution

JOURNAL ENTRIES

(1)

Materials Control	$ 5,100	
Vouchers Payable		$ 5,100

To record actual cost of direct materials and supplies purchased.

(2)

Materials in Process	$ 4,095	
Overhead Control	500	
Materials Control		$ 4,595

To record materials and supplies consumed in production processes according to requisitions.

(3*a*)

Payroll Control	$ 5,946	
Vouchers Payable		$ 5,946

To record vouchering of payrolls, both direct and indirect.

(3*b*)

Labor in Process	$ 5,246	
Overhead Control	700	
Payroll Control		$ 5,946

To distribute payrolls per payroll analysis; direct labor, $5,246; indirect labor, $700.

(4)

Overhead Control	$ 425	
Vouchers Payable		$ 425

Vouchering of overhead costs:
rent, $200; repairs, $50; power, light, and heat, $175.

(5*a*)

Overhead Control	$ 175	
Accumulated Depreciation, Machinery and Equipment		$ 100
Prepaid Insurance		25
Accrued Taxes Payable		50

Monthly adjustments for depreciation, insurance, and taxes.

(5*b*)

Overhead in Process	$ 1,800	
Overhead Control		$ 1,800

To transfer total actual overhead costs to Overhead in Process account.

(6)

Finished Goods	$10,000	
Materials in Process		$ 3,200
Labor in Process		4,800
Overhead in Process		2,000

To record standard cost of units completed during the month.

Elements of cost	Units	Standard cost per unit	Amount of standard
Material	400	$ 8	$ 3,200
Labor	400	12	4,800
Overhead	400	5	2,000
Total		$25	$10,000

(7)

Work in Process Inventory	$ 825	
Materials in Process		$ 400
Labor in Process		300
Overhead in Process		125

To transfer work in process inventory at standard from work in process accounts to the Work in Process Inventory account; full value is given material while labor and overhead are considered ½ finished.

Elements of cost	Units	Standard cost per unit	Amount of standard
Material	50	$ 8	$400
Labor	25	12	300
Overhead	25	5	125
Total		$25	$825

(8*a*)

Accounts Receivable	$10,500	
Sales		$10,500

To record sales for January: 350 units @ $30.

(8*b*)

Cost of Goods Sold	$ 8,750	
Finished Goods		$ 8,750

To record the standard cost of units sold during January: 350 units @ $25.

(9)

Material Price Variance	$ 455	
Materials in Process		$ 455

To record variance from standard price for actual quantity of material consumed.

Actual pieces	Actual price	Standard price	Price variance	Amount of variance
9,100	$0.45	$0.40	$0.05	$455

(10)

Material Quantity Variance	$ 40	
Materials in Process		$ 40

To record cost of excess materials used priced at standard.

	Pieces
Actual quantity used per requisitions	9,100
Standard quantity (450 units × 20 pieces)	9,000
Excess of quantity used over standard	100

Cost of excess quantity: 100 × $0.40 (standard price) = $40.

(11)

Labor Wage Variance	$ 86	
Labor in Process		$ 86

To record the variance from standard labor price.

Actual hours	Actual wage rate	Standard wage rate	Wage rate variance	Amount of variance
4,300	$1.22	$1.20	$0.02	$86

(12)

Labor Time Variance	$ 60	
Labor in Process		$ 60

To record variance due to excess of actual over standard labor time.

	Hours
Actual labor-hours per payroll	4,300
10 standard hours per unit × 425 units (400 units completed + 50 units ½ completed)	4,250
Excess of actual labor-hours over standard	50

50 hr. × $1.20 (standard rate) = $60.

(13)

Overhead in Process	$ 200	
Overhead—Budget Variance		$ 200

To record saving in actual overhead compared with standard overhead.

Standard overhead per budget	$ 2,000
Actual overhead	1,800
Amount saved over standard	$ 200

(14)

Overhead in Process	$ 150	
Overhead—Capacity Variance		$ 150

To record the variance in overhead due to actual production (direct labor-hours) being in excess of standard production.

	Hours
Actual direct labor-hours per payrolls	4,300
Standard direct labor-hours per budget	4,000
Excess of actual hours over standard	300

300 hr. × $0.50 (standard overhead rate) = $150

(15)

Overhead—Efficiency Variance	$ 25	
Overhead in Process		$ 25

To record the loss due to excess hours of overhead, because labor-hours were used in excess of standard labor-hours for production of period (see entry 12).

	Hours
Actual direct labor-hours per payroll	4,300
Standard direct labor-hours (425 units × 10 hr.)	4,250
Excess of actual direct labor-hours over standard	50

50 hr. × $0.50 (standard overhead rate) = $25

(16)

Materials in Process	$ 400	
Labor in Process	300	
Overhead in Process	125	
Work in Process Inventory		$ 825

To transfer balances of work in process from the Work in Process Inventory account to the original work in process accounts so as to show opening balances on Feb. 1.

Standards as a Means of Costing Completed Production. After standards are determined for materials, labor, and overhead, the standards are used for costing purposes during the accounting period. As work is completed and transferred from production processes to the finished goods stockroom, the standard cost card for each product is used as the basis for determining the cost of the goods completed; the standard cost is multiplied by the number of units shown as finished on the daily or weekly production report. The general ledger entry required is a debit to Finished Goods and credits to Materials in Process, Labor in Process, and Overhead in Process for the standard cost of completed production.

The Finished Goods account and the subsidiary finished goods ledger show the standard cost of products in stock. As units are sold, they are issued from the finished goods stockroom at standard cost; a summary entry is made periodically debiting Cost of Goods Sold and crediting Finished Goods at standard cost.

Accounting for Actual Costs. During the accounting period actual costs are recorded in the accounts, Materials Control, Payroll Control, and Overhead Control. The cost of materials purchased is entered in the subsidiary stock ledger in detail and is charged in total to Materials Control in the general ledger; the credit is to Vouchers Payable and the medium of entry is the voucher register. Payrolls are vouchered weekly and are entered as a debit to Payroll Control and as a credit to Vouchers Payable. Costs such as repairs, light and power, telephone and telegraph, and rent are vouchered and charged to the Overhead Control account. At the end of the accounting period adjusting entries are made for depreciation, taxes accrued, and insurance expired; the Overhead Control account is debited and Accumulated Depreciation, Accrued Taxes Payable, and Prepaid Insurance are credited. The total amount of supplies and indirect materials consumed is transferred from Materials Control to Overhead Control, and the indirect labor for the period is charged to the Overhead Control account and credited to the Payroll Control account.

At the end of each accounting period the actual amount of materials consumed is charged to the Materials in Process account and is credited to the Materials Control account; the total amount of the direct labor payroll is debited to the Labor in Process account and is credited to the Payroll Control account; and the total overhead for the period is charged to the Overhead in Process account and is credited to the Overhead Control account. Thus the three work in process accounts show debits representing the total actual cost of production for the period and credits exhibiting the total standard cost of units completed and transferred to finished stock.

Computation of the Value of Work in Process Inventories. If there are no units of production remaining in process at the end of the accounting period, the balances of the work in process accounts represent variances between standard and actual costs. If an inventory of work in process exists, it is necessary to evaluate the inventory before variances between standard and actual costs are computed. The methods employed in the evaluation of inventories are identical with the principles explained in dealing with process costs, with the exception that standard costs are used as a basis for costing instead of actual costs. Standard costs, as shown on standard cost cards, must be used in order to cost all production on the same basis. Production completed during the period is costed at standard, and goods remaining unfinished are evaluated on the same basis.

In order to determine the stage of completion of units remaining in process, it is necessary to examine each batch and to estimate the progress made toward its completion in terms of proportion or percentage. Thus it may be estimated that the 10 units remaining in process are one-half completed. If the standard cost per unit of material is $1, of labor $3, and of overhead $1.50, the 10 units represent 5 units in terms of completed products, and the value of the work in process inventory at standard cost is $27.50. Assuming the same facts, if it is found that all the material is used at the beginning of the production process, the inventory is considered to represent 10 units in terms of completed products for materials and 5 units in terms of completed production for labor and overhead. Thus the inventory value is $10 for material (10 units × $1), $15 for labor (5 units × $3), and $7.50 for overhead (5 units × $1.50) or a total of $32.50.

The inventory of work in process at standard may be transferred temporarily from the work in process accounts to a Work in Process Inventory account at the end of each accounting period, or the amount of each inventory may be brought down as balances in the work in process accounts after the variances in each account have been transferred to separate variance accounts. If the first plan is followed, the balances are restored to work in process accounts as opening balances for the next period and the Work in Process Inventory account is credited. In either case the work in process inventory appears on the balance sheet for the period as a current asset.

Computation of Variances. After work in process inventories have been determined, the balance remaining in each work in process account is indicative of the differences between standard and actual costs. For proper managerial control over costs, it is essential that each balance be carefully dissected into its component parts and that separate variance accounts be created to isolate and emphasize the causes underlying each variance.

The most common causes of variances may be classified as follows: material price variance, material quantity variance, labor wage variance, labor time variance, overhead—budget variance, overhead—capacity variance, and overhead—efficiency variance. The derivation of each variance requires an explanation.

Material Price Variance. Material price variance represents the excess cost or the saving resulting from the purchase of direct materials consumed in production during the period at prices above or below the standard prices set for materials. If a loss is experienced, the Material Price Variance account is debited and the Materials in Process account is credited; if a saving results, the Materials in Process account is debited and the Material Price Variance is credited for the amount of the gain.

The method used in computing the variance is as follows: obtain from material requisitions or a materials summary sheet the total quantity of direct materials used; ascertain the actual cost of the materials from the stockroom records; secure the standard cost for each class of material from standard cost cards; multiply the actual quantity of materials consumed by the actual cost per unit; multiply the actual quantity of materials by the standard cost per unit; subtract the total standard cost of materials from the total actual cost, or vice versa; and the resultant is the material price variance.

In the illustrated problem the actual pieces of material used total 9,100; the actual price per piece is $0.45, while the standard price is $0.40; therefore the amount debited to the Material Price Variance account is $455.

Material Quantity Variance. The material quantity variance is the indicator of the efficiency with which materials were utilized in production processes during the accounting period. A debit balance in the account shows the total cost of materials used was in excess of standard requirements; a credit balance indicates the saving over the standard cost in the use of materials. The Material Quantity Variance account is debited and Materials in Process is credited for the cost of materials wasted over standard requirements. Materials in Process is debited and the Material Quantity Variance account is credited for the cost of materials saved over standard.

The basis for the computation of the material quantity variance is the record of materials consumed during the period. In some plants the material requisitions showing the actual quantities used are the source of the information, but in other concerns daily or weekly production records exhibit the quantities of materials consumed. The actual quantities of each class of material used are compared with the standard requirements as shown on the standard cost cards, and the quantities wasted or saved are multiplied by the standard price per quantity to obtain the net loss or gain through the use of direct materials.

In the illustrated problem the actual quantities of materials per requisition are 9,100 pieces while the standard requirements are 9,000 pieces (450 units × 20 pieces), which indicates that 100 pieces were used in excess of standard. This quantity is costed at the standard material price of $0.40 a piece according to the standard cost card, and the Material Quantity Variance account is debited for $40.

Labor Wage Variance. The labor wage variance reflects the difference in the existing wage scale and the wage rates set as standards. If the rate of wages paid is in excess of the standard wage rate, the Labor Wage Variance account will receive a debit and the Labor in Process account will be credited at the end of each accounting period. If the actual wage rates are below the standard rates, a credit balance in the Labor Wage Variance account will reflect this condition and the Labor in Process account will be debited at the end of the period.

A comparison between the actual wages paid as shown on payroll sheets and standard wage rates as recorded on standard cost cards is the basis for the computation of the labor wage variance. The actual labor-hours are multiplied by the actual wage rate for each class of direct labor; the actual labor-hours are multiplied by the standard wage rate for each class of direct labor; and the difference between the two constitutes the labor price variance.

In the problem the actual direct labor-hours are 4,300; the actual wage rate is $1.22 per hour; the standard wage rate is $1.20 per hour; and the resulting labor wage variance, representing a loss, is $86. The variance is shown as a debit balance in the Labor Wage Variance account.

Labor Time Variance. The labor time variance is the barometer of the efficiency with which direct labor has been applied to the production of the period. A debit balance in the Labor Time Variance account indicates that the enterprise has experienced a loss because direct labor-hours in excess of standard have been expended, while a credit balance shows that a saving has resulted because fewer direct labor-hours were required than standard performance. When the Labor Time Variance account is debited, a corresponding amount is credited to the Labor in Process account; a credit to the Labor Time Variance account requires an equal amount as a debit in the Labor in Process account.

The labor time variance is computed by comparing the actual direct labor-hours, per payrolls, with the standard direct labor-hours and multiplying the difference, which represents the excess hours used or hours saved as compared with standard requirements, by the standard wage rate for each class of labor. The standard direct labor-hours are computed by multiplying the actual units of production for the period by the standard hours per unit as exhibited in the standard cost cards.

In the problem the actual direct labor-hours per payroll total 4,300; the standard hours are 4,250 (425 units × 10 hr. per unit); the excess of actual hours over standard is 50 hr.; and the 50 hr. multiplied by the standard rate of $1.20 per hour equals $60, the labor time variance.

Overhead—Budget Variance. The three remaining variances result from the computation of the standard overhead rate by the formula:

$$\frac{\text{Standard overhead for budget period}}{\text{Standard direct labor-hours (or direct labor cost) for budget period}} = \text{standard rate per direct labor-hour}$$

The overhead—budget variance is related directly to the numerator of the formula, but the overhead—capacity variance and the overhead—efficiency variance are derivatives of the denominator, the standard direct labor-hours.

The overhead—budget variance indicates how closely management has adhered to the standard budget for overhead for the period. If the variance account has a debit balance, it is indicative that actual overhead costs have exceeded the standard budget of overhead for the period; a credit balance shows that a saving in actual costs, compared with the budget, has been realized. The comparison of actual overhead for the period with standard overhead per budget should be made in detail, item by item. The variance for each item, summarized as a single amount in the Overhead—Budget Variance account, should be analyzed carefully, and the causes for its existence should be determined. The Overhead in Process account is credited when the variance account is debited and is debited when the latter is credited. The amount of the overhead—budget variance is computed by comparing the actual overhead costs for the period with the standard overhead costs per budget.

In the problem the standard overhead costs per budget were $2,000; the actual overhead costs were $1,800; and the amount saved over standard was $200.

Overhead—Capacity Variance. A debit balance in the account indicates that a smaller number of direct labor-hours representing production were expended during the period than was provided for in setting standard production in terms of direct labor-hours and in computing the standard overhead rate. A variance is created because the standard overhead rate was not applied to enough hours of production to absorb all the overhead provided for in the budget. A credit balance in the Overhead—Capacity Variance account signifies that a greater number of direct labor-hours of production have been expended than was provided for in the standard production budget for the period. Overhead has been overabsorbed through the application of the standard rate to more direct labor-hours than were anticipated. When the variance account is debited or credited, a corresponding credit or debit is made in the Overhead in Process account.

The variance is computed by comparing the standard direct labor-hours per the production budget with the actual direct labor-hours per payrolls for the period and by multiplying the number of excess or deficiency hours by the standard overhead rate. If the actual direct labor-hours are less than the standard hours, an idle time factor results and the multiplication of the hours of idle time by the standard overhead rate per hour equals the total unabsorbed overhead, which is a loss to the enterprise.

In the problem there were 4,000 hr. set as the standard direct labor-hours for the period, but the actual direct labor-hours total 4,300. The 300 direct labor-hours in excess of standard is multiplied by the standard overhead rate of $0.50 an hour to equal $150, the amount of the Overhead—Capacity Variance account credit balance.

Overhead—Efficiency Variance. This variance is a barometer by which management may be informed of the overhead cost of excess direct labor-hours applied to the period's production or the saving in overhead resulting from the completion of the period's production in less than the standard direct labor-hours. A debit balance in the Overhead—Efficiency Variance account indicates that, for the production for the period, there were actual direct labor-hours employed in excess of the standard direct labor-hours required for the work.

If the standard direct labor-hours required for a job total 20 hr. and the actual hours incurred are 22, there has been a dual loss to the enterprise. Two hours in addition to the standard were required to complete the job. The two hours costed at the standard wage rate per hour, which may be assumed to be $1.20, will reflect a loss of $2.40 which will appear as a debit balance in the Labor Time Variance account, discussed in a previous section. A second form of loss was experienced in the form of additional overhead because, for each extra direct labor-hour in excess of standard requirements, plant facilities, including such overhead items as depreciation, supervision, power, light, rent, supplies, indirect labor, and repairs, were utilized. Overhead is incurred largely on the basis of time, and each hour of plant use is just as important an overhead cost factor as labor is a cost element.

In computing the overhead—efficiency variance, it is necessary to follow the procedure used in connection with the labor time variance and to compare the actual direct labor-hours per payroll with the standard direct labor-hours for the period's production; the difference represents the excess or saving of direct labor-hours as compared with standard. The resultant number of hours is multiplied by the standard overhead rate for the period to obtain the loss or gain, which is shown by a debit or credit in the Overhead—Efficiency Variance account.

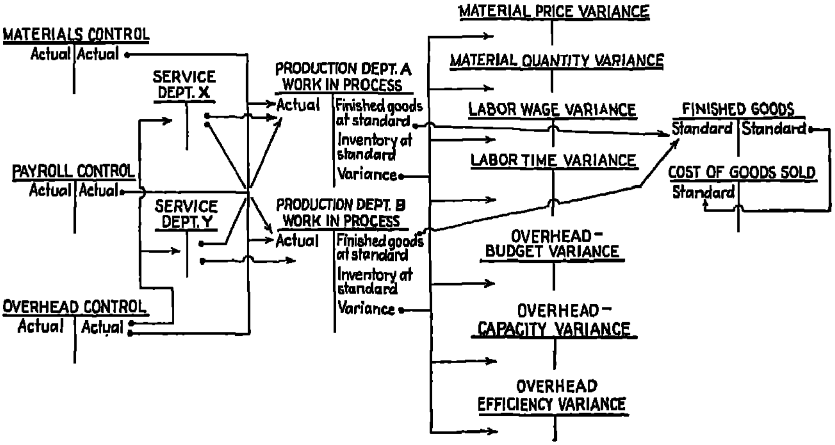
In the problem the actual direct labor-hours per payroll total 4,300; the standard direct labor-hours are 4,250 (425 units × 10 hr. per unit); the 50 actual direct labor-hours in excess of standard requirements are multiplied by the standard overhead rate of $0.50 an hour; the $25 thus obtained is the debit balance of the Overhead—Efficiency Variance account.

ACCOUNTING PROCEDURE FOR DEPARTMENTALIZED ENTERPRISES—METHOD I

When an enterprise is departmentalized into service departments and production departments or operations, the standard cost accounting procedure has a slightly more intricate development. The same general plan may be followed as was explained in connection with enterprises not departmentalized, with the exception that changes should be made in the preparation of standards and in the classification of cost data. A graphic illustration of the flow of accounting data is given as Exhibit 94.

Exhibit 94

Diagram of Standard Cost Accounting Procedure when Production Department Accounts are Debited for Actual and Credited for Standard Costs in Departmentalized Enterprises (Method I)



The accounting program for departmentalized enterprises may be outlined as follows:

a. The preparation of material, labor, and overhead standards for each product for each production department in advance of the accounting period.

b. The use of a work in process account for each production department.

c. The use of standard costs in costing all work completed during the accounting period, the production department accounts being credited and Finished Goods account debited at standard.

d. Transfer of the standard cost of goods sold from Finished Goods to Cost of Goods Sold.

e. During the accounting period, the recording of actual material cost in a Materials Control account, actual labor cost in a Payroll Control account, and actual overhead items in an Overhead Control account.

f. At the end of each accounting period the transfer of actual cost of direct materials and the actual direct labor cost from the Materials Control and Payroll Control accounts to the work in process account for each production department in accordance with the actual material and labor utilized in each department.

g. At the end of each accounting period, upon the basis of analysis of each cost, the apportionment of the total actual overhead in part to service department accounts and in part to the work in process account for each production department either directly or by means of equitable bases of distribution.

h. The allocation of the total cost of each service department to the work in process account for each production department by means of an equitable distribution base.

The remaining steps in the procedure are similar to the plan outlined for enterprises which are not departmentalized. At the close of the accounting period the actual costs are registered as debits, and the standard cost of production, completed during the period, appears as credits in the production department work in process accounts. An inventory is taken at standard cost of the unfinished units remaining in process in each of the production departments, and the amount is either transferred from the departmental accounts to a Work in Process Inventory account or is used as an inventory figure to constitute the opening balance of each production department account for the next accounting period.

Variances are computed in accordance with the methods used for enterprises not departmentalized.

Advantages of Departmentalization. The advantages attributed to departmentalization of a plant in which a system of standard costs is installed are similar to those discussed in connection with process cost accounting in enterprises maintaining service and production departments. The more minute the classification of costs, the greater is the management's control over production activities. The departmental classification is particularly essential in the case of overhead. Standard overhead application rates may be computed and applied as an element of cost for each product and production department to each standard cost card. When production departments exist as costing units, a separate standard rate based upon the most equitable means of apportioning overhead may be computed for each department. Thus the standard direct labor-hours may be the most advantageous base in one department, while the standard machine-hours or the standard direct labor cost may be more satisfactory bases for other departments.

Departmentalization facilitates the comparison of standard and actual costs, aids in the isolation of forms of inefficiency and superior performance, and makes possible the preparation of comparative departmental reports.

Other Standard Cost Accounting Procedures. There are other methods of accounting for standard costs by which work in process accounts are charged for actual costs of production and are credited for the standard cost of work completed and transferred to Finished Goods. The more important plans may be briefly summarized as follows:

a. A Materials in Process account, a Labor in Process account, and an Overhead in Process account may be used for each production department to record actual costs as debits and standard costs as credits.

b. A work in process account may be used for each product or each line of products to summarize the actual costs of each product or line of products as debits and the standard costs of production for each product or line of products as credits.

c. A Materials in Process account, a Labor in Process account, and an Overhead in Process account can be used for each product or line of products.

When there are many production departments or products, the general ledger may become too congested if separate work in process accounts are maintained for each production department or product, and variance accounts for each department or product are used. It may be advantageous to subjugate detailed information regarding work in process and variances to subsidiary records and to exhibit the data on analysis sheets. For example, if there are 20 production departments, a controlling account termed Production Departments may be used to show the total actual production costs as a debit and the total standard cost of production completed during the period as a credit. A columnar analysis sheet or a separate subsidiary ledger account may be used to show the actual and standard costs for each production department. A single variance account of each type may be maintained in the general ledger to summarize the total variances by type, while a columnar analysis sheet may be used as a subsidiary record to record the variances of each type for each production department.

METHOD II: CHARGE WORK IN PROCESS ACCOUNTS WITH STANDARD COSTS, CREDIT WITH STANDARD COSTS, AND COMPUTE VARIANCES PRIOR TO ENTRIES IN WORK IN PROCESS ACCOUNTS

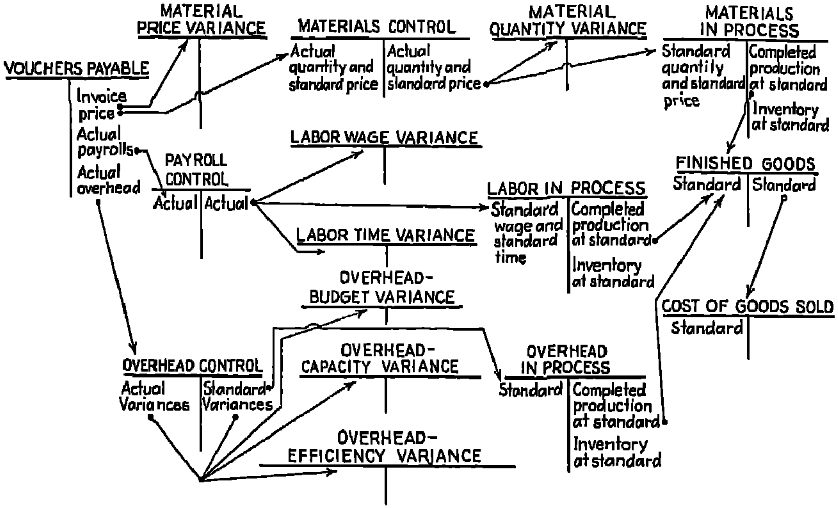
Method I, the standard cost accounting procedure by which work in process is debited with actual costs and credited with standard costs, may be criticized because variances are not derived until the close of each accounting period which, as a post-mortem examination of the plant operating efficiency, may be too late to be of maximum value to management in controlling production activities. The "historical" feature of recording and analyzing variances which is typical of this method may be remedied by use of Method II, which provides for the daily or weekly recognition of variances between actual and standard conditions of direct material and labor costs.

The accounting procedure requires a greater amount of day-to-day accounting and cost analysis than does Method I, but the additional cost of clerical help should be more than compensated for in the form of daily control by management over plant operations. Exhibit 95 presents graphically a standard cost accounting procedure when work in process accounts are charged at standard and credited at standard and when material and labor variances are computed prior to work in process entries. The accounting treatment and the derivation of variances are discussed for materials, labor, and overhead successively.

Accounting for Materials. There are two methods of accounting for materials when the Materials in Process account is to be charged at standard costs and material variances are to be computed prior to entries being made to the Materials in Process account.

Exhibit 95

Diagram of Standard Cost Accounting Procedure When Work in Process Accounts Are Charged at Standard and Credited at Standard and Variances Are Computed Prior to Entries in Work in Process (Method II)



One plan, illustrated in Exhibit 95, reflects the valuation of material inventories at standard costs. Material price variances are recognized and charged to a Material Price Variance account at the time purchase invoices are vouchered and charged to the Materials Control account at actual quantities and standard price. The Material Quantity Variance account is inserted between the Materials Control account and the Materials in Process account for the purpose of recording variances between actual quantities and standard quantities of material priced at standard costs.

For example, if an invoice is received for the purchase of 100 units of material X at 10 cents a unit or a total cost of $10, and the standard price of material X is 9 cents a unit, the following entry in the voucher register is required:

General ledger:

Materials Control	$9	
Material Price Variance	1	
Vouchers Payable		$10

Subsidiary ledger:

Entry in received section of stock ledger account of 100 units of material X at actual quantity, standard price of 9¢ per unit.

In this way executive attention is focused daily on variances between standard and actual prices paid for raw materials and supplies. If price differences become acute, it may be necessary to revise the selling prices of finished products because of the adverse effect on profits. Other important advantages which accrue when inventories of materials are priced at standard include the simplification of stores accounting and the saving of clerical time and labor in pricing and extending material requisitions. Standard material prices are inserted in inventory records in advance of the accounting period, and the pricings need not be changed unless standard prices are revised. Raw material inventories may be easily priced and may be shown on the periodic balance sheet at actual quantities and standard prices.

In a field study[1] of 72 companies using standard costs, it was found that three-fourths of the companies priced their materials at a standard price when materials were received. These companies carried their raw materials in their records at standard price, although in some cases the price variance applicable to unused or unsold materials was regarded as an inventory valuation account.

Daily or weekly, material requisitions priced at standard and representing actual quantities of direct materials consumed in production are sorted by jobs, processes, or production departments. The standard material quantities required for production are ascertained and the material quantity variances, multiplied by the standard price of each class of material, are debited or credited to the Material Quantity Variance account; the Materials in Process account is debited for the standard quantity and standard price of material consumed; and the Materials Control account in the general ledger and the individual stock ledger accounts in the subsidiary ledger are credited for the actual quantity and the standard price of the material used.

As an illustration, if material requisition 1098 shows that 52 units of material X were required to complete a job for which the standard material requirements were 50 units of material X and the standard price per unit is 9 cents, the following entries are necessary:

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[1] "Standard Costs for Costing Inventories," Research Series No. 13, *National Association of Cost Accountants Bulletin*, June 1, 1948, p. 1247.

Materials in Process	$4.50	
Material Quantity Variance	0.18	
Materials Control		$4.68

Subsidiary ledger:
Entry in issued section of stock ledger account for Material X of 52 units at 9¢, the standard price per unit.

A second method of accounting for materials differs from the plan just explained in that the Materials Control account in the general ledger and the stock ledger accounts are debited and credited for the actual quantity and the actual price of materials and supplies. The cost of materials purchased per invoices is charged to the Materials Control account and is credited to Vouchers Payable; individual items are recorded in the Received section of stock ledger accounts supporting the Materials Control account. Material requisitions are prepared to show both the actual quantity and price and the standard quantity and price of materials used for production. Materials requisitioned from stockrooms are credited to the Materials Control account in the general ledger and are shown in the Issued section of individual stock ledger accounts at actual quantities and actual cost. Material price variances and material quantity variances are computed and debited or credited to the Material Price Variance account and the Material Quantity Variance account, both of which are used as "buffer" accounts between the Materials Control and Materials in Process accounts to absorb differences between actual and standard material costs. The Materials in Process account is debited for the standard quantity and standard price of materials used in production processes.

For example, if an invoice is received for the purchase of 100 units of material X at 10 cents a unit or a total cost of $10, the following voucher register entry is required.

Materials Control	$10	
Vouchers Payable		$10

Subsidiary ledger:
Entry in the Received section of stock ledger account for material X of 100 units actual quantity; actual cost 10¢ per unit.

If material requisition 1098 shows that 52 units of material X were required to complete a job compared with the standard requirements of 50 units and the standard price per unit is 9 cents compared with an actual cost of 10 cents, the entries required to record the transaction are as follows:

Materials in Process	$4.50	
Material Price Variance	0.52	
Material Quantity Variance	0.18	
Materials Control		$5.20

Subsidiary ledger:
Entry in Issued section of stock ledger account for material X of 52 units at 10¢ per unit, the actual price; entry of $4.50, representing the stand-

ard quantity and standard price, in production order, if such orders are used.

Regardless of which of the two methods of accounting for materials is employed, the Materials in Process account is charged for the standard cost of materials used in production. As work is completed, the Materials in Process account is credited and the Finished Goods account is debited for the standard cost of materials applied to finished units. As units are sold, the Cost of Goods Sold account is debited and Finished Goods is credited at standard cost.

Accounting for Labor. The plan of accounting for direct labor cost is to charge the Labor in Process account for the standard cost of direct labor applied to production, to credit the Payroll Control account for the actual labor cost, and to record variances between standard and actual costs in a Labor Wage Variance account and a Labor Time Variance account.

The method of recording daily labor costs varies with the individual enterprise. A common practice is to issue a time ticket for each workman for each job showing the standard time requirement for tasks assigned. Each workman has before him, as an incentive to efficient work, the standard time requirements with which the actual time consumed is compared at the completion of the work. In many concerns a bonus is paid workmen who equal or surpass standard. When jobs are completed, notations of the standard wage rates and of actual time and actual wage rates are made on time tickets. Time tickets are sorted by production departments and jobs daily or weekly, and payrolls are prepared containing the actual time and wages of workers. Columns showing standard wage rates, total standard time, and variances between standard and actual may be inserted on payroll sheets to furnish additional information.

When payrolls are vouchered, the Payroll Control account is debited and Vouchers Payable is credited for actual labor costs. When payrolls are distributed to production, Labor in Process is debited for the standard cost of direct labor used in production, the Payroll Control account is credited for actual direct labor cost, and the Labor Wage Variance and Labor Time Variance accounts are debited or credited for variances between standard and actual direct labor costs.

Thus, if the summary of time tickets or the payroll for a week shows total direct labor cost of $1,320 composed of 1,200 actual direct labor-hours at $1.10 an hour, the actual wage rate, while the standard requirements for the work completed are 1,000 hr. at $1 or a total of $1,000, the general ledger entry is as follows:

Labor in Process	$1,000	
Labor Wage Variance	120	
Labor Time Variance	200	
Payroll Control		$1,320

The Labor in Process account is debited for the standard labor cost, *i.e.*, the standard time multiplied by the standard wage rate. The account is credited and Finished Goods is debited for the standard cost of direct labor applied to goods completed and transferred to finished stock during the period. When goods are sold, Cost of Goods Sold is debited and the Finished Goods account is credited at standard cost.

Accounting for Overhead. Material and Labor variances reflecting differences between standard and actual conditions can be computed daily or weekly, but difficulties are encountered when an attempt is made to isolate overhead variances before the end of each accounting period. Some actual overhead costs such as repairs, supplies, and indirect labor may be recorded daily, but the majority of the items, typified by taxes, rent, depreciation, power, and insurance, are recorded monthly. Therefore the most satisfactory time for the derivation of overhead variances is at the end of each accounting period.

The plan is to apply the standard overhead rate, computed at the beginning of the period, to production as it is completed and transferred to finished stock. A standard rate per direct labor-hour or machine-hour is preferred, since the majority of overhead costs accrue on the basis of time, but frequently, as an economy measure, a standard percentage per dollar of direct labor cost is used.

When the standard overhead rate is applied to production, a general ledger entry is made debiting Overhead in Process and crediting Overhead Control or, if preferred, Standard Overhead for the standard overhead applied. Through the media of voucher register entries during the accounting period and through the media of adjusting journal entries at its close, actual overhead costs are amassed as debits in the Overhead Control account and in detail in overhead standing orders or in subsidiary ledger accounts. At the end of the period total actual overhead costs appear on the debit side of the Overhead Control account, while the total standard overhead applied to production during the period is shown as a credit in the Overhead Control account or as a credit in the Standard Overhead account if such an account is used. The balance of the Overhead Control account represents variances in the form of overhead—budget variance, overhead—capacity variance, and overhead—efficiency variance. The variances are computed in a manner identical with the methods explained in connection with Method I, pages 329 to 331.

As an example, it may be assumed that the standard overhead rate for the budget period was computed as follows:

$$\frac{\text{Standard overhead for budget period}}{\text{Standard direct labor-hours for budget period}} = \frac{\$750.00}{1{,}500 \text{ hr.}}$$
$$= \$0.50 \text{ per hour}$$

The actual direct labor-hours per payroll totaled 1,200, and the standard direct labor-hours were 1,000.

In order to charge work in process for the standard overhead, the standard hours of direct labor totaling 1,000 are multiplied by $0.50 an hour, the standard overhead rate, and the following entry is made:

Overhead in Process	$500	
Overhead Control		$500

Actual overhead costs are recorded as follows:

Overhead Control	$800	
Appropriate accounts, such as Vouchers Payable, Accumulated Depreciation, Accrued Taxes, and Prepaid Insurance		$800

The entry for overhead variances is as follows:

Overhead—Budget Variance	$ 50	
Overhead—Capacity Variance	150	
Overhead—Efficiency Variance	100	
Overhead Control		$300

The overhead—budget variance of $50 is computed by subtracting the standard overhead of $750 from the actual overhead of $800. The overhead—capacity variance is obtained by subtracting the 1,200 actual direct labor-hours from the 1,500 standard direct labor-hours per budget and by multiplying the remainder of 300 hr. by the standard overhead rate of $0.50 an hour. The overhead—efficiency variance of $100 is derived by subtracting the 1,000 standard hours of direct labor from the 1,200 actual direct labor-hours per payroll and by multiplying the 200 hr. of excess time used in production by the standard overhead rate of $0.50 per hour.

The Overhead in Process account is credited and Finished Goods is debited for the standard cost of overhead applied to production completed and transferred to finished stock. The Cost of Goods Sold account is debited and Finished Goods is credited for the standard cost of goods sold during the period.

Standard Cost Problem Illustrating Accounting Procedure When Work in Process Accounts Are Charged at Standard and Credited at Standard and Variances Are Computed Prior to Entries in Work in Process (Materials Inventory at Actual Quantity and Standard Price)

The Novelty Manufacturing Co. produces a combination metal and glass ash tray. Work in process accounts are debited and credited at standard. Materials are carried in the Materials Control and stock ledger accounts at actual quantity and standard price. The standard cost card for this product shows:

Material:		
Metal for case a, 1	@ $0.05	
Metal for part b, 1	@ 0.10	
Glass c, 1	@ 0.05	$0.20
Labor: ⅔ hr. @ $1.50		1.00
Overhead: ⅔ hr. @ $0.75		0.50
Total standard cost		$1.70

$$\frac{\text{Standard overhead}}{\text{Standard direct labor-hours}} = \frac{\$4,500}{6,000} = \$0.75$$

Transactions for June include:

1. Material purchased:
   10,500 a @ 5½¢
   10,000 b @ 11¢.
   12,000 c @ 4½¢.
2. Material requisitioned:
   9,500 a @ 5¢.
   9,050 b @ 10¢.
   9,200 c @ 5¢.
3. Payroll: 6,250 hr. @ $1.62.
4. Overhead: $4,550.
5. Sales: 9,000 items @ $2.00 each.
6. Production:
   9,000 completed units.
   500 units ⅗ completed as to labor and overhead; material a has been applied.

Required:
Journal entries to record transactions for June.

Solution

JOURNAL

(1)

Materials Control	$ 2,125.00	
Material Price Variance	92.50	
Vouchers Payable		$ 2,217.50

Material	Actual quantity	Actual price	Standard price	Price variance	Amount of variance
a	10,500	$0.055	$0.05	$0.005	$ 52.50
b	10,000	0.11	0.10	0.01	100.00
c	12,000	0.045	0.05	0.005	60.00*
					$ 92.50

* Saving over standard.

(2)

Materials in Process	$ 1,825.00	
Material Quantity Variance	15.00	
Materials Control		$ 1,840.00

Material	Actual quantity	Standard quantity	Quantity variance	Standard price	Amount of variance
a	9,500	9,500			
b	9,050	9,000	50	$0.10	$ 5.00
c	9,200	9,000	200	0.05	10.00
					$15.00

(3)

Payroll Control	$10,125.00	
Vouchers Payable		$10,125.00

Labor in Process	$ 9,300.00	
Labor Wage Variance	750.00	
Labor Time Variance	75.00	
Payroll Control		$10,125.00

Actual hours	Actual wage rate	Standard wage rate	Wage rate variance	Amount of variance
6,250	$1.62	$1.50	$0.12	$750

Actual hours	Standard hours	Variance in hours	Standard wage rate	Amount of variance
6,250	6,200	50	$1.50	$75

(4)

Overhead Control	$ 4,550.00	
Vouchers Payable		$ 4,550.00

Overhead in Process	$ 4,650.00	
Overhead—Budget Variance	50.00	
Overhead—Efficiency Variance	37.50	
Overhead—Capacity Variance		$ 187.50
Overhead Control		4,550.00

Actual overhead	$ 4,550.00
Standard overhead per budget	4,500.00
Excess of actual overhead over standard	$ 50.00

Excess actual hours over standard (see entry 3)	50
Standard overhead rate per labor-hour	$ 0.75
Efficiency variance	$ 37.50

Actual direct labor-hours per payroll	6,250
Standard direct labor-hours per budget	6,000
Excess of actual hours over standard	250
Standard overhead rate	$ 0.75
Capacity variance	$ 187.50

(5)

Accounts Receivable	$18,000.00	
Sales		$18,000.00

Cost of Goods Sold	$15,300.00	
Finished Goods		$15,300.00

(6)

Finished Goods	$15,300.00	
Materials in Process		$ 1,800.00
Labor in Process		$ 9,000.00
Overhead in Process		4,500.00
Work in Process Inventory	$ 475.00	
Materials in Process		$ 25.00
Labor in Process		300.00
Overhead in Process		150.00

Other Standard Cost Procedures. As indicated in connection with Method I, there are other classifications of work in process which may be used in lieu of a Materials in Process, a Labor in Process, and an Overhead in Process account. In factories operated as departmentalized organizations, it may be advantageous to have for each production department a work in process account which is debited and credited for standard costs. Other possibilities include the use of three work in process accounts for each production department, one each for material, labor, and overhead; a work in process account for each product or line of products; and three work in process accounts for each product or line of products.

METHOD III: STANDARD COSTS INCORPORATED IN ACCOUNTING RECORDS EXCLUSIVELY AS STATISTICAL DATA

It is probable that the method of accounting for standard costs most commonly used is that of delegating standard cost data to subsidiary records and not including standards in general ledger accounts. If this plan is followed, the general ledger accounts contain actual costs which are employed in costing work in process, finished goods, goods sold, and evaluating inventories, while subsidiary records are recording media for both actual and standard costs. Variances between actual and standard costs, computed daily or weekly in subsidiary records, give important statistical information which management may use in controlling factory operations.

Although standard costs may be divorced from the general ledger accounts in any type of cost accounting system and continue to be of value to management, the inclusion of standards exclusively in subsidiary records appears to be an especially effective plan in connection with special-order industries. Therefore enterprises which manufacture for special order and have a system of job order cost accounting in connection with standard costs are used in exemplifying Method III.

Necessity for Standards in Special-order Industries. Standard cost methods are generally considered to be most readily adaptable to enterprises that manufacture standard, uniform products or lines of products in large quantities. In fact standards were first associated with standard products when it was reasoned that, if quantity production of like products existed in an industry, it should be possible to standardize methods and to eliminate waste and inefficiency. Standards can be prepared with little difficulty in mass-production plants where parts, labor operations, machine processes, assemblies, and the finished products are consistently uniform from day to day. Standards can be determined in advance of the budget period and can generally be used without revision as a measure of performance during the period. For this reason some cost accountants insist that standards can be incorporated successfully only in connection with process cost accounting systems in mass-production plants, but others feel that standards can be employed in special-order industries to a limited extent in some concerns and in all phases of operations in other concerns.

From the management's point of view standards are more of a necessity in the special-order or job order plant than in mass-production plants. Special-order business is obtained largely by quotations and written bids which should be computed upon predetermined costs. Unless the cost estimates are based upon carefully prepared price standards and standards of factory performance, accurate quotations cannot be prepared. Since no two jobs are alike and since waste and inefficiency which existed on particular jobs in the past should not be repeated, production orders exhibiting actual costs on similar jobs are not satisfactory bases for the preparation of cost estimates. Likewise, quotations based upon the production manager's "years of experience" or upon costs of other enterprises are unreliable. In order to secure new business, it is generally necessary to operate a plant in accordance with a high degree of efficiency, to fabricate individual orders with a minimum of materials, labor, and overhead, to keep total costs at the lowest possible figure commensurate with high-quality products, and to quote prices lower than or equal to those of competitive enterprises. Contrary to the opinion of many accountants, standards may be used in special-order plants in preparing quotations and in maintaining a high level of efficient production.

Difficulty in Setting Standards for Special-order Industries. In the mass-production plant, standards may be set for each product and department for long periods of time; quantity and time standards require revision only when changes are made in products or in methods of production. In the special-order plant the cost accountant is faced with the problem of preparing new standards for each order received, but the problem is simplified in concerns in which there is a similarity in many orders and processes. For example, if a structural steel concern receives a series of orders for steel for airplane hangars, the standards prepared for one order may be adjusted slightly and made to meet the specifications of the others if the material, labor, and machinery requirements contained in the various orders are similar. The difficulty encountered in setting standards is in proportion to the lack of similarity in orders and processes and the extent to which materials and parts, and labor and machine operations are standard for all orders or groups of orders.

Important characteristics of standard costs which favor their use in special-order industries include the fact that they may be applied to all of the elements of cost or to one independently of others; that they may be used for one or more products or prepared for one or more production departments without being applied generally to all products and departments; and that they may be incorporated only in subsidiary records or may be tied in with the general ledger accounts as a part of a double entry system of accounting. Thus in a special-order plant the cost accountant may adapt standards to lines of products and to departments which are best fitted to their use without disturbing other existing actual cost accounting methods.

Preparation of Standards in Special-order Industries. Material standards are prepared without great difficulty in the majority of special-order plants. Detailed specifications, drawings, and blueprints generally are available for each job so that it is possible to list the parts and to count and to weigh the materials required. Records of waste and spoilage can be used as a basis for estimating normal waste which is unpreventable. For purposes of pricing standard material quantities, contract prices, price lists, prices per stock records, or estimates of prices, forecasted to be the prevailing ones during the accounting period, may be selected.

Labor time standards present some difficulty because each job requires special processing and labor operations. The standard time for each operation is obtained by means of a series of time studies in a manner identical with that used in mass-production plants. The procedure is complicated by the fact that an entirely new group of time studies may be necessary for each new order received, or at least time studies must be made for each operation which has not been standardized for other jobs. The problem of determining time standards for labor is simplified to some extent by setting standards for processes, machines, and labor operations and by charting the results so that, as each order is scheduled, the standards already set up can be accepted or adjusted to meet its special requirements. It is estimated that, in special-order factories which have been operating for a number of years, from 60 to 75 per cent of all the possible labor operations that may be required for special jobs are known and can be charted by time study engineers as the basis for labor time standards. Thus it is not a difficult matter to assemble time standards already known and to compute standards for a few untested operations for each new job. The standard time factor for each operation on each job is multiplied by the standard wage rates for each class of labor, which is generally the prevailing wage rate, to obtain the total standard labor cost for the job.

Standard overhead rates are computed on the basis of standard production, reduced to such common denominators as standard direct labor-hours, machine-hours, or direct labor cost. The same methods of determining the standard rates are used for special-order plants as in mass-production plants, but in the former it is more difficult to estimate overhead and production for the budget period. Overhead costs vary to some extent with production and, unless orders are received far in advance of the budget period, the forecast of costs which may be considered standard conditions must necessarily be estimates. Production based upon special orders may vary from year to year to a marked degree, unless regular orders can be depended upon from regular customers. The difficulty of setting standard overhead rates which will allow for indeterminable quantities of production may be circumvented to some extent by the use of flexible budgets and by the maintenance of several levels of standard overhead rates for various volumes of production.

Standard costs for processes, machines, and labor operations which can be standardized are tabulated on standard cost cards which are available for use when their application to special orders can be made. The standards prepared for each job are recorded on a production order which is used to identify the work as it progresses through the plant.

Accounting for Standard Costs in Special-order Industries. Method III, which consists of incorporating standard costs in accounting records exclusively as statistical data, appears to be the most practical plan for special-order industries which employ a job order cost accounting system in recording actual costs. Job order cost accounting is largely day-to-day accounting, with a production order used to record the actual direct material, direct labor, and an applied amount of overhead for each job as it is completed in each production department or operation. Periodically the detailed cost information is summarized and recorded in general ledger accounts. It is generally considered impractical to attempt to superimpose standard costs upon such an actual cost system by including both actual and standard costs in the general ledger as operating data.

Two plans of recording standards only as statistical data are usable. One plan provides for the recording of standard costs on production orders in advance of actual production and the accumulation of actual costs at the completion of jobs so that a comparison between actual and standard costs can be made. Actual costs are recorded on production orders and in general ledger accounts in the manner described for job order cost accounting; standard costs are tabulated only on production orders, since there is no direct relationship between standards and general ledger accounting data. The second plan provides for a closer relationship between standard costs and general ledger accounting data by including standard costs in Memorandum money columns in journals and in general ledger accounts as well as in production orders.

Inclusion of Standard Costs in Production Orders Exclusively. After standard costs have been prepared for the elements of costs, material, labor, and overhead for each special job scheduled for plant production, they may be entered in standard cost columns on production orders so that each supervisor and worker is informed of the performance expected in the completion of the work. A goal has been set which is both a guide and an incentive. As the work is completed in each department, the

EXHIBIT 96 PRODUCTION ORDER CONTAINING BOTH STANDARD AND ACTUAL COSTS

PRODUCTION ORDER

Product Frame
Style NC
Quantity 100 units
For Acme Machine Company

Order No. 1096
Date wanted Jan. 31
Date began Jan. 20
Date completed Jan. 22

	Material cost			Labor cost			Overhead			Total cost		
	Standard	Actual	Variance	Standard	Actual	Variance	Standard	Actual	Variance	Standard	Actual	Variance
Dept. A:												
Material:												
Standard: 20 units x @ 50¢	$10.00									$10.00		
Actual: 22 units x @ 55¢		$12.10	$+2.10								$12.10	$+2.10
Labor:												
Standard: 8 hr. @ $1.00				$ 8.00						8.00		
Actual: 6 hr. @ $1.10					$ 6.60	$−1.40					6.60	−1.40
Overhead: 50¢ per hour							$4.00	$3.00	$−1.00	4.00	3.00	−1.00
Total cost, Dept. A	$10.00	$12.10	$+2.10	$ 8.00	$ 6.60	$−1.40	$4.00	$3.00	$−1.00	$22.00	$21.70	$−0.30
Dept. B:												
Material:												
Standard: 10 units y @ 10¢	$ 1.00									$ 1.00		
Actual: 15 units y @ 10¢		$ 1.50	$+0.50								$ 1.50	$+0.50
Labor:												
Standard: 4 hr. @ 75¢				$ 3.00						3.00		
Actual: 5 hr. @ 75¢					$ 3.75	$+0.75					3.75	+0.75
Overhead: 60¢ per hour							$2.40	$3.00	$+0.60	2.40	3.00	+0.60
Total cost, Dept. B	$ 1.00	$ 1.50	$+0.50	$ 3.00	$ 3.75	$+0.75	$2.40	$3.00	$+0.60	$ 6.40	$ 8.25	$+1.85
Total cost of order	$11.00	$13.60	$+2.60	$11.00	$10.35	$−0.65	$6.40	$6.00	$−0.40	$28.40	$29.95	$+1.55

actual costs incurred are tabulated on each production order and a variance is computed and recorded on orders for each element of cost. Variances may be analyzed daily by foremen and major executives, and the reasons for variances may be ascertained. Exhibit 96 is a form of production order containing columns for standard costs, actual costs, and variances.

Under this plan no disposition need be made of variances, since they do not affect operating costs or inventories. Actual costs are the basis for the valuation of inventories and the preparation of periodic operating statements; standard costs are solely a means of gauging productive efficiency.

EXHIBIT 97

LEDGER ACCOUNT WITH ACTUAL AND STANDARD COLUMNS

Account________________ No.________________

Date	Explanation	✓	Actual cost Dr.	Standard cost Dr.	Variance	Date	Explanation	✓	Actual cost Cr.	Standard cost Cr.	Variance

Inclusion of Standard Costs in Journals and Ledger Accounts. The second plan of exhibiting standard costs as memorandum information is more complicated in procedure and more costly in operation. The plan provides for the insertion of standard costs in Memorandum money columns in journals and general ledger accounts at the same time actual costs are recorded so that a daily comparison between actual and standard costs may be made. Journals are arranged with two sets of debit and credit columns, Actual and Standard, and ledger accounts may be prepared with three sets of debit and credit columns: Actual, Standard, and Variance. A form of ledger account is illustrated as Exhibit 97.

If this plan of multiple column entry of each transaction is employed, it is necessary to show standard and actual figures on all original records such as material requisitions, labor time tickets, payroll summaries, and production orders. Transactions are recorded in journals and general ledger accounts at both standard and actual costs; the variances are shown in separate columns. The variances consist of total amounts; in order to exhibit the amount of variance attributable to each cause, it is necessary to show a detailed analysis in supporting work sheets or reports.

Actual costs are used as operating cost data, while standard costs serve the purpose of statistical information by which management may make comparisons. Inventories and the cost of goods sold are computed strictly on an actual cost basis. The disposition of variances does not present a problem because they are not incorporated in any way with actual accounting data.

The plan of including two sets of costs, standard and actual, in journals and ledgers is not favored by many accountants. The amount of detailed accounting involved in maintaining a regular job order cost accounting system and in paralleling it with standard costs in general ledger accounts is too great to warrant its adoption by many enterprises. The most satisfactory plan of accounting for standard costs is to incorporate standards as a part of the regular accounting records according to Method I or II or similar plans. If none of these plans is practical, as for example in special-order industries, standard costs can be included satisfactorily in production orders and in other subsidiary records (as explained in the preceding section), and variances can be made available to management through the media of daily, weekly, and monthly reports. There appears to be little value in complicating journals and general ledger accounts with standard costs when actual costs are the operating cost data.

CHAPTER XVIII

ANALYSIS, INVESTIGATION, AND DISPOSITION OF VARIANCES FROM STANDARDS; STATEMENTS FOR MANAGEMENT

GENERAL CONSIDERATIONS

Analysis and Investigation of Variances a Function of Management. In preceding chapters many pages have been devoted to the proper preparation of material, labor, and overhead standards and the accounting procedures and techniques used to record standard costs, actual costs, and variances from standards for manufacturing enterprises. Regardless of the type of cost system employed, management is provided with weekly and monthly summaries of actual and standard cost statistics which can be used in formulating price and production policies and comparing costs and profits for products, jobs, departments, divisions, and plants. It is the opinion of the authors, who have examined the standard cost systems of more than 50 manufacturing enterprises, that in the majority of these concerns the management is using cost data for comparative purposes and in determining over-all company policies but is not taking advantage of the opportunities available for controlling plant operations by means of a detailed analysis and investigation of variances from standards in each phase of the plant operations.

Detailed reports of variances from standards for each operation and department for each working day provide barometers of plant efficiency that are vital to foremen, supervisors, and top management in directing their attention to the weak and strong points in the company's daily operations. If a variance from standard is unfavorable, it signifies that there has been some form of waste of materials, manpower, machinery, or overhead and that steps should be taken to correct the unsatisfactory condition. If the variance is favorable, an investigation may disclose that the standard is incorrect, that a below-standard product is being produced, that short cuts in operations are being made that may affect future sales or result in long-run higher costs, or that superior workmanship and supervision prevail in the department in question.

Reporting and Analysis of Variances by Responsibilities. If standards have been properly set, usage, performance, and cost standards have been provided for each type of material, each worker, group of workers, operation, department, and in some cases, each machine. There has been a delegation of responsibilities which can be measured and checked with predetermined standards of performance, so that variances from standard can be identified with workmen and supervisors within a few hours after the inefficiency is discovered.

An excellent definition of a *responsibility*[1] for purposes of managerial control is given as follows:

> A responsibility is an organizational unit engaged in the performance of a single function (or a group of closely related functions) having a single head accountable for activities of the unit. In this company a responsibility is established wherever the amount of cost involved or the type of operation performed makes control economically desirable and where analyses of costs as compared with standards are frequently required. A responsibility set up for cost control purposes may coincide with a cost center established to collect costs for assignment to products or it may include several such cost centers. Functional cost groups which serve solely as cost collecting centers do not constitute responsibilities.
>
> An organization in which there is clearly defined authority and corresponding placement of responsibility is a prerequisite to effective control over costs. Delegation of authority and placement of responsibility—in other words, the development of an organization—is a management function. On the other hand, measuring the costs incurred and reporting variances from standards assigned to each responsibility is a cost accounting function.

Value of Promptness in Reporting and Investigating Variances. Control of production and costs is a matter of timing; the effectiveness of the control is often in direct proportion to the speed with which a change is recommended after an unsatisfactory operating condition is discovered. Therefore it is important to focus managerial attention on off-standard conditions immediately following each shift, day, or week rather than to accumulate and summarize variances from standard each month. A month, and generally even a week, is too long a period for many off-standard conditions to remain unchecked and uncorrected, because the time interval may prevent positive identification of employees who are responsible for the unsatisfactory work. In addition there may be many hours and days during which there has been waste and inefficiency in the use of materials and labor representing total losses of some magnitude before corrective measures are taken.

The price and quality of materials is best controlled prior to or at the time of purchase; the quantity of materials and labor time should be controlled when labor operations are performed; wages and salaries should be reviewed when employees are hired or transferred to new wage classifications; and overhead costs should be analyzed as decisions are made creating such cost elements.

In some concerns daily tabulations of operating results are recorded on blackboards and charts by shifts, cost centers, and departments so that the employees are informed of their production as contrasted with standards. Daily and weekly accumulation of the results are publicized, and the individuals and groups whose results are equal to or better than standard are rewarded through recognition or prizes or bonuses. In some concerns contests, with suitable rewards, are promoted among shifts and groups on the same shift in order to encourage standard or above-standard performance. The fact that employees and supervisors are given responsibility to achieve superior performance and are considered as active partners in attaining the standards set for them each day results in more active interest in efficient operations and lower costs. Promptness in reporting results and awarding of rewards for superior performance is a requirement for the maximum success of such a program.

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[1] "The Analysis of Manufacturing Cost Variances," Research Series No. 22, *National Association of Cost Accountants Bulletin*, August, 1952, p. 1549.

Policies Regarding Disposition of Variances from Standard Costs. If the standard cost system does not provide for standards in the general ledger accounts, there is no problem of disposing of variances from standard cost. The accounting records and financial statements contain only actual costs, the standards are used only as statistical information, and no adjustments are required at the end of the accounting period for the variances. There is no uniformity of opinion among accountants as to the proper disposition of variances resulting from the use of standard costs as general ledger accounting data. One group of writers recommends that debit variances of all types should be transferred directly to Profit and Loss at the end of each month or quarter. They favor this treatment on the ground that all forms of variances represent conditions of waste, inefficiency, below standard performance, idle time, and changes in business fortune, all of which are not correctly included in manufacturing costs. This policy results in the valuation of work in process inventories and finished goods inventory at standard cost, which is deemed to be a conservative and good business policy because inventories have been depleted of all unnecessary costs resulting from off-standard operations. Furthermore, the presentation of variances as a separate group of items in the profit and loss statement indicates to management the reduction in profits due solely to off-standard plant performance.

A second group of writers advocates that all types of variances, with the exception of material price variances, should be transferred to the Profit and Loss account. In the case of material price variances it is recommended that the debit balance be prorated over inventory of materials in process, finished goods inventory, and cost of goods sold, so that price variances will be included in inventory valuations to be shown on the balance sheet and in the cost of goods sold, which is included in the profit and loss statement. The argument is advanced that price variances between standard prices and actual prices result largely from market and business conditions outside the control of the individual business enterprise and that, therefore, such variances are a legitimate addition to inventory values and to cost of goods sold.

Although the methods just explained are easy to apply and may be used for practical purposes, the variances are not disposed of in accordance with the best accounting practice. Each variance should be carefully analyzed and the causes for its incurrence should be ascertained since the proper disposition of each variance depends upon the underlying reasons for its existence.

It is logical to transfer the amount of variances which result from incorrect standards or conditions beyond the control of management, such as price changes in materials and labor wage adjustments due to new union contracts, to inventories and cost of goods sold in proportion to the number of units or dollar value of the period's production remaining on hand as inventories and representing goods sold during the period. Variances resulting from off-standard operations, which are controllable and represent responsibilities of company personnel, should be transferred to the Profit and Loss account and should be identified by cause or type in the monthly or quarterly income or profit and loss statement.

Assuming that the decision has been made to transfer the amount of variances representing inefficiency which is controllable to the Profit and Loss account, the problem arises as to *what* period's Profit and Loss account the amount of the variances should be assigned to. One group of accountants contend that, if the inefficiencies or superior performance resulted from plant operations during January, the amount of the variances should be transferred to the Profit and Loss account for January, regardless of whether January's production was sold in that month or remained as inventories to be sold in subsequent accounting periods. A second group contend that such a policy of disposing of variances results in improper "matching" of costs and revenues. They would prefer to charge the current month's revenue with only the proportionate amount of the variances representing the production completed and sold during this period upon which such off-standard operations were performed. They would treat as a deferred item or as an addition to or subtraction from inventories the amount of variances which represented off-standard performance on production remaining in inventories. The decision is important for enterprises subject to seasonal production and sale and when there is an extended period of time between production and sale of products.

In the sections that follow, the disposition of each type of variance is explained.

CONTROL THROUGH ANALYSIS OF MATERIAL PRICE VARIANCES

In presenting an analysis of material price variances and a description of managerial investigations and efforts to correct off-standard conditions, it is assumed in the sections which follow that there is in use the type of standard cost system which provides for work in process accounts being charged and credited at standard, material inventories maintained at standard cost, and material price variances computed each day prior to entry of invoices in material inventory records.

Usefulness of Material Price Variances in Control of Material Costs. In concerns where material costs are a major element in the total cost of production, a knowledge of changes in prices paid for incoming materials and transportation costs is important to management so that corresponding increases and decreases can be considered for price lists of finished products, in preparing bids for contract business, and in scheduling production of the most profitable items. In some cases the substitution of lower priced materials is considered desirable.

The purchasing department can exercise control over material costs by buying in the most economical quantities from suppliers with the lowest prices, arranging to have the purchases shipped by the lowest cost method of transportation; planning to receive the materials at the most expedient time, with a minimum of storage and handling costs; and approving invoices in time for payment before the expiration of the discount period. While these responsibilities may be directly attributed to the purchasing department, other groups, such as the planning department, budget committee, traffic division, accounting department, and the various stockkeeping departments may be indirectly responsible for inefficiency and unnecessary costs because of their failure properly to instruct or cooperate with the purchasing department. A day-to-day analysis of material price variances may permit management to discover the weak and strong points in the procurement activities of various departments of the enterprise.

Reporting of Material Price Variances. The form of reports of material price variances must be adapted to the needs and the size of the concern. Formal monthly reports may be prepared for top management, but daily or weekly reports, containing a detailed record of purchases by type of material, departments, plants, and purchasing divisions (if specialization of purchasing exists), should be available to the purchasing agent, cost accountant, and comptroller. The reports may be prepared by either the accounting or the purchasing department, but responsibility for the explanation of the material price variances rests with the purchasing agent.

An Analysis of Material Price Variances, Exhibit 98, is a form of a daily report that might be used by a concern with a limited number of daily purchases. The report contains six purchases, with the diagnosis of the purchasing agent as to the cause and the person responsible for the price variance in each case. The report contains details of purchases that were vouchered on Jan. 20.

Investigation of Material Price Variances. It is the responsibility of the comptroller, cost accountant, or other members of the management group to review the daily or weekly reports of the material price variances and to investigate the specific causes underlying the variances which have been indicated by the purchasing agent. In order to illustrate the form of investigation and the corrective measures that might be taken by management, each of the causes of material price variances listed in Exhibit 98 is treated separately.

a. Change in market price. This cause of variance is typical of many cases, particularly when market conditions are subject to fluctuations. If new price lists are being used by the purchasing department or freight rates have been changed, standards for material prices should be revised and put into effect.

EXHIBIT 98

ANALYSIS OF MATERIAL PRICE VARIANCES

Date: Jan. 20, 19—

Approved by: W. R. Smith, Purchasing Agent

Prepared by: M. S. Moore

In-voice *date*	Purchase order No.	Voucher No.	Supplier	Material or supply purchased	Quantity purchased	Actual cost		Standard cost		Variance		Per cent variance from standard	Explanation of variances
						Per unit	Total	*Per unit*	*Total*	*Per unit*	*Total*		
Jan. 2	191	406	Acme Co.	A	500	$2.10	$1,050	$2.00	$1,000	$0.10	$ 50	5	*a.* Change in market price; revision of standard recommended.
5	215	480	Reading Co.	B	2,500	0.90	2,250	0.75	1,875	0.15	375	20	*b.* Emergency purchase from a local supplier; stockkeeper failed to issue purchase requisition when minimum quantity was recorded.
3	*210*	485	Standard Supply Co.	C	8,000	0.28	2,240	0.25	2,000	0.03	240	12	*c.* Incorrect shipping instructions; purchase order marked "via express" instead of "freight."
8	230	499	Metro Co.	D	6,000	0.204	1,224	0.20	1,200	0.004	24	2	*d.* Purchasing department failed to approve voucher in time to take purchase discount.
10	242	521	Warner Co.	E	150	12.00	1,800	10.00	1,500	2.00	300	20	*e.* Acceptance by sales department of a "hurry-up" order requiring procurement of material in small quantity and shipped by air express. Additional invoice cost, $250; additional transportation cost, $50.
15	260	540	Monroe Co.	F	1,000	0.30	300	0.50	500	0.20*	200*	*40**	*f.* Purchase of materials from a competitor, the Naco Co., at a liquidation sale.
							$8,864		$8,075		$789		

* Favorable variance.

b. Emergency purchases may result from improper planning by the budget committee or planning department, carelessness of stockkeepers or department heads, too much red tape in the purchasing department in expediting purchase orders, inadequate working capital, or poor credit. In each case reported, management should push the investigation to the source of the inefficiency, which in some cases may involve a particular clerk or departmental official. Corrective measures can be taken in most instances.

c. Incorrect shipping instructions. The fault may lie with a purchasing or traffic department clerk, but the purchasing department official responsible for approving the purchase order should have noted the error. The responsibility can be definitely established in this case.

d. Discounts lost may be attributed to purchasing, accounting, filing, or disbursing department employees, but management should have little trouble determining the individuals who are responsible for this loss.

e. Acceptance by the sales department of orders which require special purchases, high transportation costs, overtime in plant operation, and priority in production schedules should be carefully analyzed by management to determine the profitableness of special orders.

f. Favorable price variances resulting from advantageous purchases are typical of savings in the cost of materials and transportation which may result from extraordinary efforts or efficiency by purchasing agents. Management should be as quick to reward meritorious service as to criticize results that are below standard.

Disposition of Material Price Variances. Daily or weekly analysis of material price variances makes possible a summarization of the amount attributed to each cause. Material price variances may be due to various forms of inefficiency or above-standard performance; they may be due to incorrect price standards resulting from changes in market prices or errors in the preparation of the original standards.

If the analysis of the variances indicates that a portion or all of the balance is the result of inefficiencies or that a saving has resulted from efficient purchasing, the loss or gain should be transferred to Profit and Loss.

If the material price variances result from changes in market prices or the use of incorrect standards, they are legitimate additions to or subtractions from inventory values and cost of goods sold. If the standard cost system, identified in this text as Method I, is used, a method of disposing of Material Price Variance is to apportion it to Work in Process Inventory, Finished Goods, and Cost of Goods Sold in proportion to the material value or material quantity of the period's production remaining in each stage. If this plan is followed, inventories of work in process and finished goods will be valued at a corrected standard material price and standard material quantity. If the standard cost system described as Method II, with material inventories maintained at standard price, is used, the Material Price Variance should be treated as a correction of inventories and cost of goods sold by assigning proportionate amounts to Materials Control, Work in Process Inventory, Finished Goods, and Cost of Goods Sold, depending upon the material value or material quantity purchased during the period that remains in each inventory stage and is represented by the cost of the goods sold.

In order to avoid the work involved in adjusting each type of inventory, an inventory valuation account, representing the total material price variance identified with inventories, is commonly shown as an addition to or a subtraction from total inventories in the balance sheet. An appropriate title for this valuation account is Correction of Material Price Standards.

CONTROL THROUGH ANALYSIS OF MATERIAL QUANTITY VARIANCES

When Method II is used as a standard cost accounting procedure, material quantity variances are computed before work in process is costed at standard, and the amount of the variances for each job, shift, cost center, and department may be made available to management in the form of daily reports, so that immediate attention can be directed to conditions of off-standard utilization of materials.

Usefulness of Material Quantity Variances in Control of Material Costs. Control of the usage of raw materials and parts begins with their requisition and continues until the production and assembly processes are completed and the finished products are sold or inventoried. If standards for material quantities are prepared for each type of material and each process, the planning and budget committees should be made aware of quantity variances as an aid in their planning for quantities of materials and requisitioning purchases to be added to inventories. If workers, foremen, and supervisors are informed that their activities result in the use of more or less than standard quantities of materials, they may take steps to correct their own off-standard operations. In any case, promptness in reporting and recognizing off-standard conditions is a prerequisite to the inauguration of plans to correct the situation.

Reporting of Material Quantity Variances. When a job or "run" requires a specific amount of material, it has become a common practice in many plants to specify that requisitions or "bills of material" be prepared for the *standard* quantity needed to complete the number of production units in the production schedule. The workmen are provided with the standard quantity of material for the job. If additional materials are required to complete the work, special requisitions, frequently of a different color for rapid sorting, are prepared for the excess quantities. Thus the attention of the supervisors is directed to excess usages of material. Variance reports for management can be prepared by summarizing the special requisitions by jobs, shifts, and departments.

In many plants the work in process is inspected at designated stages of production, and special reports of rejected work, spoiled materials, scrap, and shrinkage are used to compare actual with standard allowances for these items, and losses in excess of standards are treated as variances.

Daily summaries of material quantity variances should be made available to management for each operating center or department. The reports may contain only a comparison of actual and standard material quantities, or they may include dollar values as well as quantities. An illustration of this type of report is presented as Exhibit 99, Analysis of Material Quantity Variances.

Investigation of Material Quantity Variances. A careful review of each departmental report of material quantity variances permits management to determine the causes of off-standard performance and to take measures to control material usage. Each explanation of variances listed in Exhibit 99 is discussed below in order to illustrate the type of investigation that can be made by management for the purpose of correcting unsatisfactory operations.

a. Poor-quality materials. The planning or other requisitioning departments may have prepared improper specifications for purchases; the purchasing agent may have been negligent in placing his orders; the receiving and testing departments may have neglected to check incoming materials properly; or the shipment may have been damaged or improperly protected while in storage.

b. Change in product or production methods. A revision of original standards is required when changes are made in production methods or the composition of products. The investigation of variances of this type may result in changes in price schedules of finished products and in production and sales policies.

c. Careless workmanship. An investigation may be made of employment methods and policies of the personnel department; the compensation policies may be reviewed; and the training and supervision of employees for the type of job in question may be analyzed.

d. Machinery in need of repair. This condition may be typical of many pieces of machinery and equipment in the plant. The investigation may result in changing the company's policy as to the advisability of repairing old equipment as contrasted to purchasing new machinery. The problem may be settled simply by replacing the machine operator with a better trained, more efficient employee who can operate the machine in its present condition.

e. New products. In plants where new products and designs are treated as a part of the regular production schedule, there may be a loss of materials and labor time until employees have been properly trained for the new methods required. Standards cannot be met in most cases unless experimentation is separated from regular production or there is a training program for employees prior to assignment to jobs. The decision as to the best policy should be made after the cost of alternative programs has been determined.

f. Savings in materials. While investigation may disclose that material has been saved by superior workmanship, it is possible that the finished product is inferior to company requirements; it is possible that the savings have been obtained at the expense of extra labor time at high labor rates, the result being a net loss to the concern; or it is possible that the material quantity standards have been improperly set.

Disposition of Material Quantity Variances. The list of causes of material quantity variances generally comprises various forms of inefficiency in handling and processing materials. Since one purpose of standard costs is to remove such forms of inefficiency from production costs, the amount of the variance attributed to this cause should be transferred to Profit and Loss.

If a portion of the variance has resulted from using incorrect standards, an adjustment should be made to Work in Process Inventory, Finished Goods, and Cost of Goods Sold.

EXHIBIT 99

ANALYSIS OF MATERIAL QUANTITY VARIANCES

Date: Jan. 7, 19__ Dept. No. 1 Shift No. 1 Approved by: R. S. Turpin, Supervisor Prepared by: T. R. Jones

Type of material used	Production: quantity of finished product	Actual quantity required	Standard quantity	Quantity variance from standard	Per cent quantity variance from standard	Standard cost per unit	Variance in dollars from standard	Explanation of variances
A	200	210	200	10	5	$1.50	$ 15.00	a. Poor-quality material; below specifications in purchase requisition.
B	200	450	400	50	12½	0.60	30.00	b. Change in product; material quantity standard should be revised.
C	100	330	300	30	10	2.00	60.00	c. Careless workmanship; high percentage of spoiled work.
D	100	60	50	10	20	1.00	10.00	d. Machine No. 5 in bad repair; machine should be replaced or reconditioned.
E	50	600	400	200	50	0.50	100.00	e. New product; excess quantity used in experimentation and training workmen.
F	50	190	200	10*	5	0.80	8.00*	f. Saving in material due to superior workmanship.
							$207.00	

* Favorable variance.

CONTROL THROUGH ANALYSIS OF LABOR TIME AND WAGE VARIANCES

It is important as an aid in control of labor costs to prepare separate analyses of labor time variances and labor wage variances. Labor time variances are the responsibility of foremen and supervisors of departmental operations as well as of cooperating service divisions such as the purchasing, planning, routing, personnel, maintenance, and repair departments. Labor wage variances may be within the province of departmental control but more frequently result from personnel and administrative policies or from economic conditions beyond the control of management.

EXHIBIT 100

ANALYSIS OF LABOR TIME VARIANCES

Date: Jan. 7, 19__ Dept. No. 1 Shift No. 1 Approved by: T. R. Orr, Supervisor
Prepared by: R. N. Ott

Run No.	Production, cases	Standard hours	Actual hours	Standard wage rate	Standard cost of actual labor-hours	Time variance		Explanation of variances
						Over standard	Under standard	
1	1,890	63.0	63	$1.11	$ 69.93			
2	1,890	63.0	63	1.11	69.93			
3	2,100	70.0	72	1.11	79.92	$ 2.22		*a.* Machine shutdown for adjustment.
6	1,800	60.0	63	1.11	69.93	3.33		*b.* Inefficiency of inexperienced employee.
7	1,890	63.0	63	1.11	69.93			
8	1,890	63.0	63	1.11	69.93			
11	1,704	56.8	63	1.11	69.93	6.88		*c.* Extra processing of poor-quality material.
12	1,848	61.6	63	1.11	69.93	1.55		*d.* Delay in receiving materials from stockrooms.
13	1,560	52.0	63	1.11	69.93	12.21		*e.* Slowdown by workmen due to a disagreement with foreman regarding rest periods.
14	1,890	63.0	63	1.11	69.93			
	18,462	615.4	639		$709.29	$26.19		

Reporting of Labor Time Variances. In order that maximum control over labor costs can be attained, it is necessary to report labor time variances for each shift, department, and in some cases, for each workman or group of workers for each day's operations. In many concerns the workers are able to compare their own time and the time of members of their group with the standard time allotted for their production through the use of blackboards or wall charts which contain both daily and accumulated time data. In concerns where job order costs are used with standard costs, it is a common practice to record actual and standard time, with notations of the causes of variances, on the job time tickets.

Daily reports, such as Exhibit 100, Analysis of Labor Time Variances, can be used to focus the attention of foremen, supervisors, and top management on daily operations so that unsatisfactory conditions can be investigated and corrected. Monthly reports may be prepared to classify and summarize variances from standard time, as illustrated by Exhibit 101, Departmental Manufacturing Efficiency on Completed Operations, in which Reason for variance and an indication of whether the situation was controllable (C) or noncontrollable (N) by the foreman are given in each case.[1] The explanation of the use of the report, Exhibit 101, is as follows:

EXHIBIT 101

DEPARTMENTAL MANUFACTURING EFFICIENCY
ON COMPLETED OPERATIONS

________ Plant

Dept. No...........

Code	Reason for variance		Month of			Year to date		
			Actual hours	Variance hours	Cost	Actual hours	Variance hours	Cost
0	No reason, variances less than 10 per cent.	C						
1	Estimated running time too high. Reported to standards department.	N						
2	Estimated setup time too high. Reported to standards department.	N						
3	Men's effort and/or ability above average.	C						
5	New machine, standard has not been changed.	N						
6	Change in methods, standard has not been changed.	N						
7	New or improved tools, standard has not been changed.	N						

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[1] "The Analysis of Manufacturing Cost Variances," Research Series No. 22, *National Association of Cost Accountants Bulletin,* August, 1952, pp. 1558–1561.

Exhibit 101 (*Continued*)

Code	Reason for variance		Month of			Year to date		
			Actual hours	Variance hours	Cost	Actual hours	Variance hours	Cost
8	Used setup from previous job.	C						
9	Time set for man operating one machine. Ran two.	C						
10	Time clock registers to 0.1 hr. only.	N						
11	Work done under special supervision.	C						
Total gains								
0	No reason, variances less than 10 per cent.	C						
51	Standard too low. Reported to standards department.	N						
52	First time job was made.	C						
53	Slow or obsolete machine used.	N						
54	Planning not correct. Was changed. Standards department notified.	N						
55	Could not follow operation as planned, delivery requirements.	N						
56	Operations in previous departments not performed as planned.	C						
57	Time set for man operating two machines. One available.	N						
58	Quantity too small.	N						

Exhibit 101 (*Continued*)

Code	Reason for variance		Month of			Year to date		
			Actual hours	Variance hours	Cost	Actual hours	Variance hours	Cost
59	Extra setup result of machine breakdown.	N						
60	Extra work.	N						
61	Two men had to be assigned to job owing to its nature.	N						
62	Learner, apprentice, or student.	N						
63	Man inexperienced. Undergoing instruction.	N						
64	Different operators used owing to difficulty of job.	C						
65	Assisting inexperienced operator on another machine.	N						
66	Man's effort and/or ability below average.	C						
67	Operation not performed correctly. Additional time required.	C						
68	Parts spoiled. Had to make additional parts.	C						
69	Tools not available at time job was started.	N						
70	Trying out new tools.	N						
71	Tools not correct when job was started. Had to be corrected.	N						
72	Broke tool. Time lost redressing and sharpening.	C						
73	Oversized material used.	N						

Exhibit 101 (*Continued*)

Code	Reason for variance		Month of			Year to date		
			Actual hours	Variance hours	Cost	Actual hours	Variance hours	Cost
74	Castings warped, but are within foundry tolerances.	N						
75	Castings not to dimensions. Time lost waiting for instructions.	N						
76	Material too hard. Frequent sharpening of tools required.	N						
77	Improper supervision.	C						
79	Illegible blue prints.	N						
80	Blowholes and porous castings.	N						
81	Sheet stock—secondary material or scrap ends used.	N						
99	Full quantity or operations not complete.	N						
Total losses								
Total								
Efficiency % controllable by foreman		C						
Efficiency % noncontrollable		N						
Efficiency % over-all								

This company's operations consist of machining and assembly on a job order basis. The number of employees in all operations is approximately 3,800. Labor variances, expressed in man-hours only, are analyzed according to a predetermined list of causes.

On completion of each operation, the foreman indicates the reason for labor-hours over or under standard, using the code shown in Exhibit 101. Timekeepers record the information on time cards and summaries are produced by mechanical tabulation. When the variance is less than 10 per cent of standard time, no explanation is required. If a given variance is due to two or more causes, the foreman apportions the variance hours between the causes. Variance data recorded by the timekeepers is summarized monthly by the accounting department to produce the report shown in Exhibit 101. In the report, individual variance causes are designated as controllable or noncontrollable according to whether or not the cause is controllable by the foremen. This classification of variances was developed jointly by accounting and top factory management. While the position of some items may be questionable, the classification is sufficiently reliable to have practical usefulness. Supervision over foremen is relied upon to overcome any tendency to designate controllable causes as noncontrollable.

Investigation of Labor Time Variances. The availability of daily, weekly, and monthly reports of variance from standard labor time with causes indicated for each case allows management to locate the point of inefficiency, isolate the controllable factors, place responsibility, and determine what action can be taken to prevent a recurrence of the trouble. The controllable factors listed in Exhibit 101 may be grouped as follows:

a. Conditions within an operating department or cost center, involving the scheduling of work and use of materials, assignment and supervision of personnel, utilization of tools and machinery, and interrelationships with other departments.

b. Preparation and review of labor standards which are the responsibility of standards department.

c. Cooperation of service departments, such as the planning, purchasing, stockroom, personnel, and maintenance and repair, in scheduling production, providing materials, selecting and training workmen, and maintaining tools and equipment in good condition.

d. General company policies regarding labor relations and compensation, repair and replacement of tools and machinery, scheduling of production, and working conditions in the plant.

Disposition of Labor Time Variances. The amount of labor time variances attributed to various forms of inefficiency which are controllable should be transferred to Profit and Loss. The amount of the variances resulting from the use of improperly prepared standards and from conditions considered to be beyond the control of management are correctly treated as adjustments to Work in Process Inventory, Finished Goods, and Cost of Goods Sold.

Reporting of Labor Wage Variances. The reporting of labor wage variances is generally the responsibility of the personnel or payroll department and is the result of the analysis of weekly, semimonthly, or monthly payrolls. Labor and salary rates are determined largely by collective bargaining or are based upon prevailing wage rates in the industry or community. Within the basic wage pattern determined by external factors, management exercises some control over labor rates by setting standard job classifications and compensation rates for specific jobs.

Weekly and monthly reports, depending upon the payroll period, should be prepared to show for each department the variances from standard wage or salary rates for each employee and group of workers, the total amount of the wage variance, and the reason for the variance in each case.

Investigation of Labor Wage Variances. In some concerns the wage rate standards are revised whenever actual pay rates are changed, but in other enterprises the standards are revised at regular intervals, monthly, quarterly, or annually. Therefore wage variances may result from a lag in changing standards. Prompt revision of standards results in a minimum of confusion to employees and management.

Variances from standard wage rates may be caused by:

a. Using employees with the wrong classification and wage rate for jobs.
b. Paying above or below standard rates during seasonal or emergency operations.
c. Paying guaranteed day rates to workers who are not able to earn established piece-rates.
d. New workmen not paid established standard rates.
e. Personal favoritism of supervisors in promoting employees to higher job classifications and rates without proper authorizations.

The investigation in each case should result in pin-pointing responsibility for the off-standard condition and corrective action being taken.

Disposition of Labor Wage Variances. Generally the analysis of these variances will disclose that all or a portion of the total amount has resulted from the use of out-of-date standards or from conditions beyond the control of management. The amount of variances attributed to such causes should be apportioned to Work in Process Inventory, Finished Goods, and Cost of Goods Sold according to the labor value or labor time representing the period's production remaining in each stage of completion or sale at the end of the period.

If a portion of the labor wage variance is considered to be due to inefficiency and is controllable, the amount should be transferred to Profit and Loss.

CONTROL THROUGH ANALYSIS OF OVERHEAD VARIANCES

The general approach to the control of overhead costs through the use of standards is basically different from that used to control material and labor costs. Overhead costs include a variety of items, some representing fixed and uncontrollable costs which are subject to little or no change with productivity and others representing costs which are controllable and dependent upon the amount of activity.

A second peculiarity in the control of overhead costs is the impracticability of reporting and analyzing on a daily or weekly basis. A few overhead costs, such as salaries and supplies, may be accumulated and reported each week, but the majority of these costs are recorded on a monthly basis, many of these items arising from monthly adjusting entries.

A third factor, resulting from the complex nature of overhead costs, is the difficulty of defining responsibilities for many of the costs. For example, foremen may be directly responsible for supplies and indirect labor in their departments, but overhead costs affecting the departments' operations, such as transportation, cleaning, heating, repairs, and overtime, are partly controllable by departmental supervisors and partly subject to the authority of one or more service department officials.

It is a function of management to define responsibilities as accurately as possible and to obtain the maximum utilization of plant facilities within the cost limitations set as overhead standards for each production and service department.

Reporting, Analysis, and Investigation of Overhead—Budget Variances. Overhead—budget variances are computed by comparing actual overhead costs with the standard overhead costs authorized for a department in the standard overhead budget.

As an aid in the control of overhead costs, it is customary for the accounting department to provide the manager of each production and service department with a monthly report exhibiting each item of actual overhead cost, the standard cost, and the resulting variance. In some concerns all departmental costs are included, whether they are controllable by departmental officials or result from the assignment of fixed and noncontrollable items such as rent, taxes, executive salaries, and apportioned amounts of service departments' charges. Another plan is to provide each departmental supervisor with a list of the actual and standard costs and variances for the overhead items that are the responsibility of and are controllable by him and his employees. The departmental official is expected to analyze and explain the variances which are identified with his department.

If variances have been caused by changes in the volume of production or other circumstances unforeseen at the time of the preparation of the standard budget, extra budget allowances may be made. In cases where extravagance or inefficiency is considered to be the cause of the variance, the department officials may be directed to change their methods of operation so that their costs will conform to budget allowances.

Disposition of Overhead—Budget Variance. The overhead—budget variance may be due to seasonal conditions of overhead, or to the incurrence of costs in excess of standard requirements due to inefficiency, or to both causes.

If the normal overhead rate is determined for a year consisting of 12 separate accounting periods, the standard overhead for the year was derived by adding together the 12 monthly estimates of overhead. At the end of any single month actual overhead may exceed the standard amount for that month, but the excess will be offset by counteracting differences during other months of the normal period. If an analysis of the variance discloses that the balance arises from seasonal conditions of overhead, the variance should be treated as a deferred item because it will be adjusted as a result of offsetting conditions in subsequent periods.

If the overhead—budget variance is due to costs being incurred in excess of the standard budget requirements, a form of business inefficiency may have resulted. The amount of the variance due to this cause should be taken directly to Profit and Loss.

The variance may have resulted from conditions beyond the control of management or from an incorrectly prepared standard budget of overhead costs. The amount of variance attributed to this cause should be apportioned to Work in Process, Finished Goods, and Cost of Goods Sold, depending upon the quantity or cost of production remaining in each stage at the end of the accounting period.

Reporting, Analysis, and Investigation of Overhead—Capacity Variance. This variance represents the amount of overhead which has been underabsorbed or overabsorbed because the number of actual direct labor- or machine-hours falls short or is larger than the standard time considered as the production capacity for the period. A detailed report of production in terms of labor- or machine-hours, showing actual, standard, and variances in hours for each department, can be prepared on a daily, weekly, or monthly basis, depending upon the period for which standard budgets of production have been prepared. Departmental officials should be requested to analyze each variance and to indicate the cause in each case. Circumstances such as lack of sales orders, shortages of materials, labor troubles, machine breakdown, and fire or wind damage may account for low production volume. Superior workmanship, excellent supervision, addition of another shift, or use of additional or improved machinery may account for the above-capacity volume. It is the responsibility of management to investigate each reported cause and to take action to correct the unsatisfactory production conditions or to revise the standard production volume if the conditions are noncontrollable.

Disposition of Overhead—Capacity Variance. If the analysis of the variance indicates that it is a seasonal condition, resulting from the use of normal overhead rates, and that the existing seasonal conditions will be offset by productive activity in later periods, the variance should be treated as a deferred item until it is liquidated in subsequent periods by counteracting conditions.

If the variance is considered to be the result of inefficient operations which are controllable by management or if it represents extraordinarily efficient operations,.it should be transferred to Profit and Loss.

If wind, water, or fire, or in extreme cases, a long strike have resulted in low production, the variance resulting from these causes, considered to be beyond the control of management, may be transferred to a special loss account to be closed to Profit and Loss or Earned Surplus.

Reporting, Analysis, and Investigation of Overhead—Efficiency Variance. This variance may be included as a supplement in the report of labor time variances for each department or may be the subject of a special monthly report. The departmental comparisons of actual and standard direct labor-hours are utilized in obtaining variances from standard time, which are multiplied by the standard overhead rate for the department in order to obtain the overhead—efficiency variance. The

EXHIBIT 103

STATEMENT OF STANDARD MANUFACTURING COSTS FOR JULY, 19__

	Product 1		Product 2		Total	
Materials (standard)	$1,200.00		$1,120.00		$2,320.00	
Add: Material price variance	250.00	$ 1,450.00	99.90	$1,219.90	349.90	$ 2,669.90
Labor (standard)		6,400.00		2,400.00		8,800.00
Overhead (standard)		3,200.00		400.00		3,600.00
Adjusted standard manufacturing cost		$11,050.00		$4,019.90		$15,069.90

EXHIBIT 104

STATEMENT OF STANDARD COST OF GOODS SOLD FOR JULY, 19__

	Product 1			Product 2			Total		
Beginning inventory, finished goods (standard)			$ 4,050.00			$1,004.50			$ 5,054.50
Adjusted standard manufacturing cost			11,050.00			4,019.90			15,069.90
Adjusted standard cost of goods available for sale			$15,100.00			$5,024.40			$20,124.40
Less: Ending inventory, finished goods (standard):									
Material	$150.00			$707.00			$857.00		
Add: Material price variance	31.25	$181.25		63.06	$ 770.06		94.31	$ 951.31	
Labor		800.00			1,515.00			2,315.00	
Overhead		400.00	1,381.25		252.50	2,537.56		652.50	3,918.81
Adjusted standard cost of goods sold			$13,718.75			$2,486.84			$16,205.59

EXHIBIT 105

STATEMENT OF PROFIT AND LOSS FOR JULY, 19__

	Product 1		Product 2		Total	
Sales		$17,500.00		$5,000.00		$22,500.00
Less: Adjusted standard cost of goods sold		13,718.75		2,486.84		16,205.59
Standard gross profit on sales		$ 3,781.25		$2,513.16		$ 6,294.41
Less: Variances in excess of standard:						
Material quantity variance	$ 50.00		$ 3.50		$ 53.50	
Labor wage variance	246.00				246.00	
Labor time variance	160.00				160.00	
Overhead—capacity variance	720.00				720.00	
Overhead—efficiency variance	80.00	1,256.00		3.50	80.00	1,259.50
				$2,509.66		$ 5,034.91
Add: Variances less than standard:						
Labor wage variance			$ 78.00		$ 78.00	
Labor time variance			60.00		60.00	
Overhead—capacity variance			40.00		40.00	
Overhead—efficiency variance			110.00	288.00	110.00	288.00
Net profit for July		$ 2,525.25		$2,797.66		$ 5,322.91

and sales at both standard and actual costs according to Method II, when raw materials inventories are carried at actual quantity and standard price. Selling and administrative costs are not shown in detail in the statement.

In the preparation of the Profit and Loss Statement, Exhibit 102, it has been assumed that the material price and labor wage variances have resulted from the use of incorrect standards and that these variances are proper adjustments of inventories and cost of goods sold. All other variances are considered to be the result of inefficient or efficient operations within the control of management and are treated as general Profit and Loss charges or credits.

A different presentation of cost and income data, showing comparisons by products, is given in separate monthly statements of Standard Manufacturing Costs, Exhibit 103; Standard Cost of Goods Sold, Exhibit 104; and Profit and Loss, Exhibit 105. In the preparation of this series of statements, it is assumed that the material price variance has resulted from the use of incorrect standards or from market conditions beyond the control of management and is properly treated as an addition to inventories and cost of goods sold. All other variances are considered to be direct charges or credits to general Profit and Loss, because they are the result of below- or above-standard operations within the control of management.

Part III

CONTROL AND ACCOUNTING FOR DISTRIBUTION AND ADMINISTRATIVE COSTS

CHAPTER XIX

DISTRIBUTION COST ACCOUNTING

Need for Control of Distribution Costs. During the past 25 years, because of the increased purchasing power of consumers and the requirements of a war economy, there has been a constantly increasing demand for manufactured products which producers have filled by operating their plants to capacity and by plant expansions. Technological improvements, lower material costs, and the increased efficiency of factory operations through adoption of standard costs and scientific factory management have brought about increased productive capacity and lower production costs. In spite of this tendency for production costs to decline, distribution costs have risen relatively. Sales departments have been increased in personnel; advertising expenditures have been expanded; customers have been bombarded by direct-by-mail literature and canvassed by highly paid salesmen; various demonstration and promotional schemes have been tried; and trade territories have been widened, with a resultant increase in transportation and shipping costs. In some cases manufacturers have discarded such traditional middlemen as the wholesaler or jobber and have attempted to find more direct channels of distribution for their products. Many experiments have been made, and trial-and-error methods have been used without adequate means of checking their efficiency. The vast expansion of distribution processes has resulted in excessive costs and much waste.

Authorities in the field of marketing are constantly urging the application of the same scientific streamlining to distribution processes and the control of costs that has been applied so successfully to production.

The objectives of a complex program of accounting, control, and analysis of distribution costs may be summarized as follows.

a. Classification and accounting for distribution costs by channels of distribution, departments, territories, salesmen, orders, lines of products and customers, comparative statements being submitted to management each month or quarter.

b. Preparation and use of standards for distribution functions in order to control costs by delegating responsibility, establishing measures of efficiency, providing incentives to personnel, and supplying predetermined costs as an aid in budget preparation and formulation of pricing policies.

c. Analysis of distribution costs as a guide to management in making current business decisions and setting future policies.

The first of these objectives, classification and accounting for distribution costs, is considered in this chapter and the following chapter. The second, standards for distribution costs, is explained in Chap. XX, while the third objective, distribution cost analysis, is described in Chap. XXII.

Robinson-Patman Act. The Robinson-Patman Act, adopted in 1936 as an amendment to the Clayton Act of 1914, became a part of the Federal antitrust laws enacted for the purpose of aiding in the preservation of the competitive economic system. The amendment was necessary because the Clayton Act failed to treat price discrimination as a specific monopolistic practice. Management's interest in distribution cost analysis increased immediately with the passage of the Robinson-Patman Act, because knowledge of distribution costs became a prerequisite to the intelligent and proper determination of prices.

The general objective of the act is set forth in the following clause taken from the law: "to protect the independent merchant, the public whom he serves, and the manufacturer who sells him his goods from exploitation by unfair competitors."

Specifically the law makes it unlawful for any person engaged in commerce to discriminate in price or terms of sale between purchasers of commodities of like grade and quality. Thus a person selling a product to two or more customers who compete in the resale of the product must not discriminate so as to give an unfair advantage to one or more of these customers in preference to others. The act operates only if the purchases involved are in interstate commerce; if there is a sale of goods and not a sale of services; and if the effect of the discrimination is to lessen competition substantially, tend to create a monopoly in any line of commerce, or injure, destroy, or prevent competition.

Discrimination may take many forms in addition to an outright price difference. Such forms include cash, quantity, and volume discounts, delivery service, allowances for services, advertising appropriations, brokerage fees or commissions, and consignment policies. However the act does not prohibit price differentials which are due to differences in costs or services offered, provided that all customers within a certain classification are treated equitably. If there is a price differential, it cannot exceed the difference in cost, although there is no prohibition of a price differential less than the difference in cost. The seller may sell to all customers at the same price although there is an actual difference in cost. The burden of proof is on the seller to show the differences in cost which are reflected in his price. The cost accountant must be prepared to determine differences in costs so that price differentials will not exceed them.

If lower costs result to the seller because of the elimination of service to the buyer, quantity purchases, delivery methods, or marketing procedures, the seller has a legal right to pass on to the buyer such savings in the form of a correspondingly lower price. In the Standard Oil case the Federal Trade Commission rejected the seller's cost justification of a price differential of ½ cent per gallon of gasoline allowed to Ned's Auto Supply Company. In this case the seller attempted to justify the price differential on the grounds that no sales promotional costs were allocated to Ned's Auto Supply Company because it was an established account and did not need the service. Similar examples of unacceptable allocations, such as the cost of salesmen's calls and consumer advertising, were also cited. While it may be acceptable to exempt certain customers from the allocation of a particular overhead cost, the seller failed to show that all customers in a like position were relieved of the allocation of these costs.

Producers who are bidding on large orders frequently consider such orders as "extra-volume" sales, which they may be willing to accept at a price which covers prime costs and a small part of overhead costs. The act prohibits this type of price setting on the grounds that it fails to reflect actual cost savings on a particular order or account and therefore may injure competition.

Neither the act nor the regulations of the Federal Trade Commission require any standard type of distribution cost analysis. However, if cost differences are to be determined satisfactorily, it is necessary to analyze costs by territories, products, customers, size of orders or volume of purchases, and special promotional efforts. Joint costs must be apportioned on such bases as would seem most reasonable, practical, and equitable under the circumstances of a particular case. The cost allocation used in a given situation must stand on its own merits.

Since the act does not make allowances for differences in costs, it is important that the management of a concern performing distribution functions obtain cost statistics regarding every phase of its distribution costs in order properly to determine prices. With complete cost information available, discriminatory price making can be avoided and savings in distribution costs can be passed on justifiably to the customer. The Robinson-Patman Act will continue to be an important motivating force in the encouragement of improved distribution cost accounting methods for all levels of distribution activities.

Classification of Distribution Costs. When a product is placed in a salable state, it is generally agreed that the functions of production or manufacturing have been terminated and that the distribution function has begun. In the manufacturing of a typewriter or furniture that must be shipped to dealers, the cost of manufacture includes the crating of the product ready for shipment. In bottling works the manufacturing process includes the placing of the bottles in cases; canning factories include as a cost of production the packing of cans and bottles in cases; and seed companies usually consider the packaging of seeds for retail sale as a part of production. There are many borderline costs that defy accurate classification as to production or distribution costs.

Distribution cost statistics of many types may be made available to management. Distribution costs may be classified and accounted for in terms of sales departments, territories, salesmen, lines of products, sales and production orders, and customers. One or more of these cost classification units may be used, depending upon the needs of management in controlling distribution functions and the cost of accumulating such statistics.

An illustration of a comprehensive analysis of sales and distribution costs is to be found in the case of a West Coast bakery. This large enterprise manufactures over 150 different products and distributes them directly to retailers. An analysis of sales, distribution costs, and profit and loss is made in terms of the following classifications: sales outlets, including the company's salesmen's division, the independent distributor's division, the mail-order division, and the wholesale division; territories; salesmen; and the four main classes of products: cakes, plain cookies, fancy cookies, and crackers. The statistics are compiled monthly and are compared with those of preceding months and years.

COST ACCOUNTING FOR SALES SERVICE DEPARTMENTS AND TERRITORIES

A System of Accounting for Distribution Costs for Sales Service Departments and Territories. In order to illustrate records and procedures required in the operation of a distribution cost accounting system, a detailed explanation of a cost system for an enterprise requiring cost statistics for its sales departments and territories is given in succeeding sections.

A system of internal check should be an integral part of any cost system. This is possible only through a division of accounting work, which signifies a separation of accounting records through the use of controlling accounts and subsidiary records. A chart, Exhibit 106, is presented, showing the accounts which may appear in the general ledger and the subsidiary records that each account controls. General ledger controlling accounts are shown above the double line, drawn horizontally across the page; subsidiary records are presented on the lower half of the page.

Study of the chart will disclose the following controlling account and subsidiary record relationships.

a. An account in the general ledger, termed Selling Cost Control, which summarizes all the selling costs at the end of each month. This account controls a subsidiary ledger composed of standing orders or analysis sheets, upon which selling costs of each class are entered. There should be a standing order for each type of cost, a separate sheet being used for each cost, such as advertising, sales salaries, supplies, rent of sales offices, and traveling costs.

b. A group of accounts in the general ledger for sales departments that control a subsidiary ledger composed of standing orders or analysis sheets. There may be an account in the general ledger for each sales department such as the advertising department. Each department controlling account shows in summary the total actual selling costs of the department for the month; in the standing order for that department is tabulated in detail the selling costs charged to the department.

c. An account in the general ledger for each territory that summarizes the selling costs for the territory at the end of each period. Each territorial account controls the standing order that shows in detail the selling costs apportioned to that territory.

d. A profit and loss account for each territory to summarize the selling costs charged

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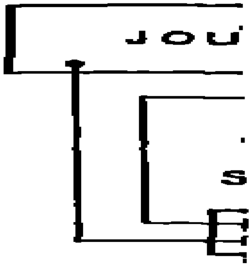

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to cost of goods sold in the territory during the month. Manufacturing costs, administrative costs, and sales for the territory are also included in the account. Each territorial profit and loss account controls a territorial profit and loss analysis sheet.

e. A General Profit and Loss account in the general ledger to which the territorial profit and loss accounts are finally closed.

Accounting for Selling Costs. From day to day the various selling costs should be recorded in the accounting records in somewhat the following manner. The supplies should be issued from the stockrooms only upon written requisitions that show the quantity, cost, and the departments or territories using the materials. At the end of the month, from the requisitions received daily, the stockkeepers may send a summary report of the supplies requisitioned by each department and by each territory to the general ledger bookkeeper, who makes an entry in the journal debiting the Selling Cost Control account and crediting Materials Control for the total cost of the supplies. The supplies summary sheet may be used as a basis for the detailed entries in the standing order for supplies. In this standing order, which is controlled by the Selling Cost Control account, each department and territory is charged for the cost of supplies used.

EXHIBIT 107

PRIMARY STANDING ORDER No.____ Newspaper advertising Year: 19__

Territory	Jan.	Feb.	Mar.	Apr.	May	June
Michigan....................						
Ohio........................						
Indiana.....................						
Illinois....................						
Total.....................						

Salaries paid to the personnel of the sales divisions are tabulated each week or month upon payroll sheets that show the amount of salaries paid for the services rendered in each sales department and territory. At the end of the month the summary payroll sheets may be used as a basis for a journal entry debiting the Selling Cost Control account and crediting Payroll Control and also for entries in the standing order for salaries, showing the amount of salaries paid to employees in each sales department and each territory. Two standing orders are illustrated. The first form for newspaper advertising, Exhibit 107, is typical for the class of costs that are assignable directly to the territories, no part of which should be charged to the sales departments. The second standing order for sales salaries, Exhibit 108, is typical of a number of standing orders that require a distribution of costs to both departments and territories.

Other selling costs, such as newspaper, magazine, billboard, radio advertising, catalogue costs, donations, shipping costs, repairs, and dues, supported by bills or invoices, are typical of the class of costs that are entered in the voucher register, when vouchered for payment, as debits to the Selling Cost Control account and as credits to Vouchers Payable. Each cost is entered in a separate subsidiary standing order, where the total cost is apportioned to the departments and territories listed in each standing order.

Another group of selling costs, including bad debts, rentals, depreciation, taxes, and insurance, is charged to the Selling Cost Control account through monthly adjusting entries made in the journal. Each of these selling costs is entered in a standing order for this class of cost, the total being allocated to each territory and department on the basis of value, floor space, or other distribution bases.

EXHIBIT 108

PRIMARY STANDING ORDER No.____ Sales salaries Year: 19__

Department or territory	Jan.	Feb.	Mar.	Apr.	May	June
Department:						
Sales (general)						
Advertising						
Shipping						
Total department costs						
Territory:						
Michigan						
Ohio						
Indiana						
Illinois						
Total territory costs						
Total sales salaries						

Bases for the Distribution of Selling Costs to Sales Departments and Territories. The establishment of distribution bases should be undertaken through the cooperation of the sales manager and executives in charge of accounting. When bases of apportioning costs have been determined, these bases will be used to distribute costs until the method is proved inequitable or until changed conditions require the formation of a better distribution method.

It may be suggested as a general working principle that the more detailed the allocation and the greater the number of factors or bases used the more accurately the distribution work will be done. It is possible to lump all the selling costs together and to distribute them to territories on the basis of total sales for each territory. Such a distribution would be easy, but the results would not be very satisfactory, because some territories receive much more service from some selling expenditures than from others. It is a matter of executive judgment to determine bases of distribution that are practical, easily used, and equitable. An error in the selection of a distribution base may result in the misstatement of departmental, territorial, and product costs through the application of incorrect amounts of selling costs to the unit involved.

Although arbitrary bases of allocation cannot be set, it seems advantageous, in developing a system of controlling distribution costs, to suggest some factors for the apportionment of selling costs to departments and to territories. The following schedule, Exhibit 109, will serve as a guide in distributing selling costs to sales departments and to territories.

Sales Departments and Territorial Standing Orders. After distribution bases have been determined and selling costs have been entered in the primary standing orders, the next step is the preparation of distribution costs by sales departments and by territories. It is not absolutely necessary to set up the sales departments' cost classification. All the primary selling costs may be transferred directly to the territorial standing orders. If this is done, however, the management will not have available a detailed analysis of selling costs for each sales department. In many cases it is the sales departments' costs that constitute a large share of the total distribution costs, and often it is in these departments that a more adequate control of costs is necessary. The departmental standing orders facilitate a detailed cost analysis for each department by the management.

The best procedure is to classify primary selling costs both by sales departments and by territories and then to distribute and to transfer the total sales departments' costs to the territories in order that all selling costs will be distributed to the territories. If the distribution accounting system is complete, there will be a standing order for each sales department and for each territory controlled by a corresponding account in the general ledger for the purpose of analyzing departmental and territorial selling costs. The group of departmental and territorial standing orders will be termed "secondary standing orders." The plan is to use these subsidiary accounting records to classify the selling costs by sales departments and by territories. As in the case of the primary standing orders, a column is used for each month or quarter.

The clerks should transfer from each of the primary standing orders the amount of that cost assigned to each department and to each territory to each departmental and territorial standing order. The secondary standing orders will exhibit in detail the amount of selling cost directly assigned to each department when the process is completed. The standing order for each territory will not show the total selling costs assignable to that division until the sales departments' costs are prorated to the territories. Thus the important information exhibited at this stage of the distribution

EXHIBIT 109

SUGGESTED BASES FOR THE DISTRIBUTION OF SELLING COSTS TO SALES DEPARTMENTS AND TERRITORIES

Selling cost	Standing orders charged	Distribution base
Newspaper and magazine advertising	Territories	Actual expenditures and circulation coverage of publications
Local radio advertising	Territories	Actual expenditures in each territory
National radio advertising	Territories	Population coverage of territories by radio network
Billboard advertising	Territories	Actual expenditures in each territory
Catalogues	Territories	Sales; number of customers
Public relations, donations, etc.	Territories	Sales
Selling salaries	Sales departments and territories	Actual salary expenditures for each division
Commissions and bonuses	Territories	Actual commissions and bonuses earned by the personnel in each division
Travel	Sales departments and territories	Actual travel for personnel in each department or territory
Shipping costs: freight, cartage, boxes, and packing supplies	Territories	Actual shipping costs for each territory; or sales
Postage, stationery, supplies, telephone, and telegraph	Sales departments and territories	Actual expenditures for each division
Repairs	Sales departments and territories	Actual cost of repairs for each division
Rent of sales offices	Sales departments	Floor space
Rent of branch or territorial offices	Territories	Rental charge for space used by each territory
Depreciation	Sales departments and territories	Rate of depreciation and value of equipment and property used by each division
License fees	Sales departments and territories	License charges on equipment used by each division
Taxes on property	Sales departments and territories	Value of property used by each division
Insurance—fire	Sales departments and territories	Value of property used by each division
Insurance—automobile	Sales departments and territories	Actual insurance charges on automobiles used by each division

process is the selling costs shown in detail for each sales department and territory.

Exhibit 110 illustrates a secondary standing order for the sales accounting department which may be considered typical of the cost analysis sheets prepared for each department in the sales division.

Distribution of Sales Departments' Costs to Territorial Standing Orders. After total selling costs have been determined for each sales department, the next step is to allocate these departmental costs to territories. The procedure is necessary in order to ascertain the total cost of operating each territory. The territorial standing orders already have a share of the selling costs, obtained when the distribution of the primary standing orders was made to departments and to territories. Since the sales departments exist only to serve and to aid in obtaining sales, all the costs of these departments are chargeable to territories.

EXHIBIT 110

SECONDARY STANDING ORDER No.____ Sales accounting department

Year 19__

Class of cost	Jan.	Feb.	Mar.	Apr.	May	June
Salaries						
Travel						
Postage						
Stationery						
Supplies						
Telephone and telegraph						
Repairs						
Rent						
Depreciation						
Taxes						
Insurance						
Total dept. costs						

The schedule, Exhibit 111, suggests bases for allocation of total sales departments' costs to the territories. Each company has its own peculiar set of operating conditions which makes impossible any standardization of distribution bases. The problem is to determine those factors which can be estimated closely or measured actually and which exert the greatest influences upon the amount of cost sustained by each sales department for the benefit of territories.

After distribution bases have been determined, it is a clerical task to compute and to allocate the total of each sales department's selling costs to each territory. The amount charged to each territory will be entered in the standing order for that territory. When the work has been completed, the total selling costs will be shown in the standing orders for the territories.

The territorial standing order for Michigan, Exhibit 112, will typify analysis sheets of this class. There will be a similar sheet for each territory or branch.

Entries in General Ledger Accounts. It has been explained how selling costs have been classified by sales departments and territories in a group of standing orders or analysis sheets that are subsidiary to the general ledger account, Selling Cost Control. These primary standing orders for such selling costs as salaries, supplies, and advertising provide information in summary form for the general ledger entry debiting each sales department account and each territory selling cost account and crediting the Selling Cost Control account for the share of the cost allocated to each division. After this journal entry has been made, the management has available the total cost of maintaining each sales department in the department accounts and the share of the selling costs assigned to territories in the territorial cost accounts.

EXHIBIT 111

SUGGESTED BASES FOR THE DISTRIBUTION OF SALES DEPARTMENTS' COSTS TO TERRITORIES

Sales Departments	Distribution Base
Advertising	Sales or directly in cases of special advertising plans
Adjustment	Actual number of adjustments, or sales quotas
Billing	Actual number of invoices or statements
Collection	Actual number of collections, or sales or credit sales
Credit	Actual applications for credit, or sales, or actual credit sales or number of accounts
Dealer and jobber service	Number of dealers and jobbers, or sales
General sales	Sales
Order	Actual number of orders
Sales accounting	Sales or actual number of charges and credits
Sales correspondence	Sales
Training school for salesmen	Number of salesmen, or sales
Shipping	Actual number of shipments, number of articles, tonnage
Traffic	Actual number of routings, types of routings, and shipping claims
Warehouse	Actual number of orders, number of articles, and tonnage handled

A second step in the closing process is the preparation of a journal entry debiting each territorial selling cost account and crediting each sales department account for the amount of sales departments' costs assigned to territories. The detail of the allocation is to be found in the secondary standing orders for territories where the distribution was made in accordance with selected bases.

Finally, a journal entry is required to transfer the total selling cost for each territory to the profit and loss account for the territory. Sales are classified and entered as credits to the territorial profit and loss accounts, the debit being to the Sales account; the cost of goods manufactured is debited to the profit and loss account for each territory and Finished Goods is credited; and the profit and loss accounts are debited for a share of the administrative cost, the credit being to the Administrative Cost Control account.[1] The territorial profit and loss accounts are finally closed into the General Profit and Loss account. The comparative form

EXHIBIT 112

SECONDARY STANDING ORDER NO.____ Michigan Year: 19__

Class of cost	Jan.	Feb.	Mar.	Apr.	May	June
Selling cost directly charged:						
Salaries						
Travel						
Postage						
Stationery						
Supplies						
Telephone and telegraph						
Repairs						
Rent						
Depreciation						
Taxes						
Insurance						
Total direct charges						
Departmental apportioned charges:						
Advertising						
Adjustment						
Billing						
Collection						
Credit						
Dealer and jobber						
General sales						
Sales accounting						
Traffic						
Total apportioned charges						
Total selling costs						

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[1] The treatment of administrative costs is explained in Chap. XXI.

of profit and loss statement can be used advantageously to report the profit or loss for each territory and the net total for the period.

Accounting Procedure and Monthly Reports Illustrated by a Problem. The accounting procedure described in the preceding sections is given concrete form through the following problem and its solution:

Illustrative Problem

The Southwestern Hardware Co. sells hardware to retail concerns through its own salesmen. The company has four sales territories coded as 1, 2, 3, and 4; and five sales service departments: general sales office, advertising, shipping, warehouse, and credit.

The selling costs for July are as follows:

Salesmen's salaries	$1,800
Salesmen's commissions	600
Office salaries	1,850
Dues and subscriptions	50
Advertising	2,000
Travel	260
Supplies	420
Depreciation of building	200
Depreciation of sales equipment	170
Property taxes on building	100
Fire insurance on building	20
Fire and theft insurance on sales equipment	30
Light, water, and heat	80
Miscellaneous sales costs	420
Total selling costs	$8,000

It may be assumed that all selling costs, with the exception of depreciation and property taxes, are vouchered and paid during the month. Dues and subscriptions and miscellaneous sales. costs are transferred directly to the General Sales Office account when the books are closed. The advertising expenditure for the month is apportioned to territories on the basis of net sales. Yearly depreciation of sales equipment is computed as 12% of the cost of equipment used in sales offices and 24% of the cost of equipment used in territories. Property taxes, depreciation of buildings, fire insurance on buildings, light, water, and heat are charged to sales departments on the basis of floor space; fire and theft insurance on sales equipment is charged to sales departments and territories on the basis of the cost of equipment used by each sales unit. The average gross profit is 35% on net sales.

The schedule on page 387 shows additional information concerning sales departments and territories for July.

The total general sales office costs, advertising department costs, and credit department costs are apportioned among territories on the basis of net sales. A survey was made of the services rendered territories by the shipping and warehouse departments; percentages for the allocation of each of these departments' costs are given in the schedule.

a. Prepare journal entries to record all transactions for July.

b. Prepare a comparative statement of selling costs for sales departments; a comparative statement of selling costs for sales territories; and a comparative territorial profit and loss statement.

Sales departments	Net sales	Salesmen's salaries	Salesmen's commissions	Office salaries	Supplies	Travel	Cost of sales equipment	Building space, square feet	Survey percentages	
									Shipping, per cent	Warehouse, per cent
General sales office....				$ 600	$ 40	$175	$ 800	800		
Advertising...........				400	60	25	600	600		
Shipping.............				250	120		1,000	2,400		
Warehouse............				300	110		2,400	12,000		
Credit................				300	20	60	200	200		
Territory 1...........	$13,000	$ 600	$200		25		2,400		30	33
Territory 2...........	10,000	400	175		15		1,200		25	27
Territory 3...........	6,500	375	100		10		800		15	12
Territory 4...........	10,500	425	125		20		1,600		30	28
Total..............	$40,000	$1,800	$600	$1,850	$420	$260	$11,000	16,000	100	100

The average gross profit is 35 per cent on net sales.

Solution

SOUTHWESTERN HARDWARE CO.

a. *Journal*

(1)

Profit and Loss—Territory 1	$8,450.00	
Profit and Loss—Territory 2	6,500.00	
Profit and Loss—Territory 3	4,225.00	
Profit and Loss—Territory 4	6,825.00	
Finished Goods		$26,000.00

Transfer of the cost of goods sold (65% of sales) to the profit and loss accounts.

(2)

Selling Cost Control	$8,000.00	
Accumulated Depreciation of Building		$ 200.00
Accumulated Depreciation of Sales Equipment		170.00
Accrued Taxes Payable		100.00
Vouchers Payable		7,530.00

Recognition of actual selling costs for the month.

(3)

General Sales Office	$1,315.18	
Advertising Dept	507.63	
Shipping Dept	442.73	
Warehouse	740.56	
Credit Dept	387.55	
Selling Cost—Territory 1	1,529.56	
Selling Cost—Territory 2	1,117.28	
Selling Cost—Territory 3	828.18	
Selling Cost—Territory 4	1,131.33	
Selling Cost Control		$ 8,000.00

Transfer of selling costs to sales service departments and sales territories.

(4)

Selling Cost—Territory 1	$1,095.56	
Selling Cost—Territory 2	863.23	
Selling Cost—Territory 3	514.47	
Selling Cost—Territory 4	920.39	
General Sales Office		$ 1,315.18
Advertising Dept		507.63
Shipping Dept		442.73
Warehouse		740.56
Credit Dept		387.55

Distribution of sales service departments' costs to sales territories.

(5)

Profit and Loss—Territory 1	$2,625.12	
Profit and Loss—Territory 2	1,980.51	
Profit and Loss—Territory 3	1,342.65	
Profit and Loss—Territory 4	2,051.72	

Selling Cost—Territory 1		$ 2,625.12
Selling Cost—Territory 2		1,980.51
Selling Cost—Territory 3		1,342.65
Selling Cost—Territory 4		2,051.72

Transfer of territorial selling costs to territorial profit and loss accounts.

(6)

Accounts Receivable	$40,000.00	
Sales		$40,000.00

Recording of sales on account.

(7)

Sales	$40,000.00	
Profit and Loss—Territory 1		$13,000.00
Profit and Loss—Territory 2		10,000.00
Profit and Loss—Territory 3		6,500.00
Profit and Loss—Territory 4		10,500.00

Transfer of sales to territorial profit and loss accounts.

(8)

Profit and Loss—Territory 1	$1,924.88	
Profit and Loss—Territory 2	1,519.49	
Profit and Loss—Territory 3	932.35	
Profit and Loss—Territory 4	1,623.28	
General Profit and Loss		$ 6,000.00

Transfer of territorial profit or loss to the General Profit and Loss account.

b. Statements

COMPARATIVE STATEMENT OF SELLING COSTS FOR SALES DEPARTMENTS
July 1 to July 31, 19__

Cost	General sales office	Advertising dept.	Shipping dept.	Warehouse	Credit dept.	Total
Office salaries	$ 600.00	$400.00	$250.00	$300.00	$300.00	$1,850.00
Dues and subscriptions	50.00					50.00
Travel	175.00	25.00			60.00	260.00
Supplies	40.00	60.00	120.00	110.00	20.00	350.00
Depreciation of building	10.00	7.50	30.00	150.00	2.50	200.00
Depreciation of sales equipment	8.00	6.00	10.00	24.00	2.00	50.00
Property taxes	5.00	3.75	15.00	75.00	1.25	100.00
Fire insurance on building	1.00	0.75	3.00	15.00	0.25	20.00
Fire and theft insurance on sales equipment	2.18	1.63	2.73	6.56	0.55	13.65
Light, water, and heat	4.00	3.00	12.00	60.00	1.00	80.00
Miscellaneous sales costs	420.00					420.00
Total selling costs	$1,315.18	$507.63	$442.73	$740.56	$387.55	$3,393.65

COMPARATIVE STATEMENT OF SELLING COSTS FOR SALES TERRITORIES
July 1 to July 31, 19__

Direct costs	Territory 1	Territory 2	Territory 3	Territory 4	Total
Salesmen's salaries	$ 600.00	$ 400.00	$ 375.00	$ 425.00	$1,800.00
Salesmen's commissions	200.00	175.00	100.00	125.00	600.00
Advertising	650.00	500.00	325.00	525.00	2,000.00
Supplies	25.00	15.00	10.00	20.00	70.00
Depreciation of sales equipment	48.00	24.00	16.00	32.00	120.00
Fire and theft insurance on sales equipment	6.56	3.28	2.18	4.33	16.35
Total direct costs	$1,529.56	$1,117.28	$ 828.18	$1,131.33	$4,606.35
Apportioned sales dept. costs:					
General sales office	$ 427.43	$ 328.80	$ 213.72	$ 345.23	$1,315.18
Advertising dept	164.98	126.91	82.49	133.25	507.63
Shipping dept	132.82	110.68	66.41	132.82	442.73
Warehouse	244.38	199.95	88.87	207.36	740.56
Credit dept	125.95	96.89	62.98	101.73	387.55
Total apportioned costs	$1,095.56	$ 863.23	$ 514.47	$ 920.39	$3,393.65
Total selling costs	$2,625.12	$1,980.51	$1,342.65	$2,051.72	$8,000.00

COMPARATIVE TERRITORIAL PROFIT AND LOSS STATEMENT
July 1 to July 31, 19__

	Territory 1	Territory 2	Territory 3	Territory 4	Total
Net sales	$13,000.00	$10,000.00	$6,500.00	$10,500.00	$40,000.00
Cost of goods sold	8,450.00	6,500.00	4,225.00	6,825.00	26,000.00
Gross profit	$ 4,550.00	$ 3,500.00	$2,275.00	$ 3,675.00	$14,000.00
Selling costs	2,625.12	1,980.51	1,342.65	2,051.72	8,000.00
Net profit	$ 1,924.88	$ 1,519.49	$ 932.35	$ 1,623.28	$ 6,000.00

COST ACCOUNTING FOR SALESMEN

For many concerns performing the functions of distribution, the analysis of selling costs by territories offers an adequate control. There may be some companies that desire a more complete classification of distribution costs and a more detailed analysis of profit possibilities. In addition to the allocation by territories, distribution costs may be classified by salesmen.

The further classification of the territorial selling costs entails the allocation of each type of cost for each territory to the salesmen who operate in that geographical area. The territorial costs may be divided into salesmen's direct cost and branch or territorial overhead. The direct costs include such items as salesmen's salaries, commissions, special advertising, travel, telephone and telegraph, and supplies. This class of selling costs can be allocated directly to each salesman.

The territorial overhead includes costs incurred for the maintenance of the territorial office or offices. Expenditures for salaries, rent, repairs, depreciation, taxes, supplies, telephone and telegraph, and salaries paid to territorial executives are so classified, but costs of sales departments such as advertising, adjustment, billing, collection, general sales, and traffic departments that have been charged to the territories are also included. All the costs may be added together and apportioned in a lump sum to the salesmen upon an equitable distribution base. The territorial selling overhead cost may be distributed equally among the salesmen or may be apportioned on the basis of sales or sales quotas.

The equal division of the overhead among salesmen has ease of administration and simplicity in its favor. It is based on the theory that each salesman receives approximately the same benefit and supervision from the territorial or branch office. For example, if the territorial selling overhead costs were $2,000 for January and if there were 10 salesmen, a charge of $200 would be made to each salesman as his share. Probably this method will be sufficiently accurate in some businesses, but it is not scientifically accurate since it does not recognize that some salesmen may have more profitable accounts, more densely populated or wealthier communities, and older and better developed territories.

A much superior method is that of apportioning selling overhead on the basis of sales quotas. Quotas may be determined for each salesman to measure his sales opportunities and to set a standard of performance. Differences in sales opportunities, in salesmen's aptitudes, in training, and in size of territories are all considered in the computation of sales quotas. When sales quotas are used as a basis, each salesman is charged with the territorial overhead in the same ratio that his sales quota bears to the total sales quota of the territory. This method is more equitable and reveals more accurately the profit or loss for each salesman. For example, assume that salesman A was allotted a sales quota of $15,000 and salesman B a quota of $10,000 for July and that their actual sales for the month were $12,000 each. If the selling overhead for July was apportioned to the two salesmen on the basis of sales, each man would receive an equal share, but if the allocation was based on sales quotas, salesman A would receive three-fifths and B would receive two-fifths. Salesman B exceeded his quota by $2,000 whereas A failed to reach his quota by $3,000; thus the sales quota method of distribution of cost would show more clearly the efficiency of each salesman when the profit and loss computations for salesmen were made.

Tabulation of the distribution of selling costs to salesmen can be made in a standing order or analysis sheet for each salesman, such as the one suggested as Exhibit 113.

EXHIBIT 113

STANDING ORDER No.____

Salesman: Robert Brown Territory: Wisconsin

Year: 19__

Class of cost	Jan.	Feb.	Mar.	Apr.	May	June
Direct selling cost:						
Salary						
Commissions						
Travel						
Postage						
Stationery						
Supplies						
Telephone and telegraph						
Total direct cost						
Apportioned costs:						
Selling overhead cost for territory						
Total selling costs						

From individual standing orders for salesmen and from manufacturing and administrative cost records, there can be prepared a comparative profit and loss statement, illustrated as Exhibit 114, showing profit or loss computations for individual salesmen in each territory.

EXHIBIT 114

THE CONSOLIDATED MANUFACTURING CO.
COMPARISON OF SALESMAN PERFORMANCE
Territory: Ohio Month: January

Salesman	Selling costs		Administrative costs	Cost of goods sold	Total cost	Net profit or loss	Net sales
	Direct charges	Indirect charges					
Roe, John	$650	$450	$400	$3,000	$4,500	$500	$5,000
Stone, Joe	300	200	200	1,500	2,200	300	2,500
	$950	$650	$600	$4,500	$6,700	$800	$7,500

COST ACCOUNTING FOR SALES ORDERS

The management of many concerns may find it advantageous to know the amount of selling cost incurred on each sales order for each territory as an aid in determining the most profitable territories and classes of orders. It may be valuable to show after the sale of an order in a particular territory the cost to manufacture, the amount of selling and administrative cost applied to the order, the total cost to make and to sell, and the profit or loss on the order. If a company's business was represented by large orders, such an analysis might prove valuable for every order sold in each territory. In other concerns it might be practical to compute these cost and profit elements only on the large orders and to make tests by computing the costs on every fifth or tenth small order in each territory. To provide for the computation of costs on orders shipped into each territory, the amount of selling cost must be applied to each order by means of distribution rates.

Territorial Distribution Rates for Selling Costs. One basis for the computation of territorial distribution rates is net sales. The rate for distributing selling costs to sales orders is obtained by dividing the total selling costs for each territory by the total net sales for that territory. For example, if the total selling costs for Texas for the month, as shown in the territorial standing order for Texas, were $50,000 and the net sales for Texas for the same period were $500,000, the distribution rate for Texas would be obtained by the following formula:

$$\frac{\text{Total selling costs for Texas for June}}{\text{Total net sales for Texas for June}} = \frac{\$50{,}000}{\$500{,}000}$$
$$= 10 \text{ per cent, the selling cost distribution rate for Texas}$$

The distribution rate for each sales territory is used as each sales order is received. For example, if Jones, a salesman in the Texas territory, sends a sales order to the home office for $100 and the territorial distribution rate for Texas is 10 per cent of sales, the amount of $10 is added to manufacturing and administrative costs; thus the computation of the cost to make and to sell and of the profit or loss on the order is made possible.

Comparison of Bases for Distributing Selling Costs. The distribution of selling costs to sales orders or to products upon the basis of net sales for each territory is probably the most practical and satisfactory method, since it is easily computed and applied. The theoretical objection that selling cost is without direct relation to the price of goods sold can be made to this method. Goods that sell at a high price may require less selling cost than those that sell at lower prices; or the opposite may be true. Likewise, small sales orders may require more selling effort than large orders.

It is impossible to select an entirely satisfactory distribution base. In most cases there are greater objections and more difficulties with other bases of distributing selling costs than with that of net sales. Other bases of distribution that may be suggested are as follows:

a. Manufacturing cost.
b. Number of sales or orders.
c. Quantity to be sold in terms of tons, pounds, thousand feet, or other units of weight or measurement.
d. Gross profit on sales.

If any of these bases are to be used, the distribution rate is determined by dividing the selling costs for each territory by the selected base for the territory in question.

There is no relation between selling costs and the cost of goods manufactured, since articles of high manufacturing cost may require less selling cost than do low-cost goods.

Most companies have such a variety of products to sell and the sales orders are so unequal in the total quantity of products sold that the number-of-sales-or-orders and the quantity-sold methods are not applicable. There is often no direct relation between selling costs and the number of orders or quantity sold.

The method of gross profit on sales has more possibilities. If the markup or percentage of gross profit can be determined for the sales for each territory, the distribution of selling costs by this method may be rather easily undertaken. The fact that it distributes a larger share of the selling cost to the more profitable products and a smaller share to the low-profit lines may be regarded as either an advantage of or an objection to this method, since the points of view of interested parties may be directly opposite.

The determination of the method of distributing territorial selling costs depends upon the particular conditions and circumstances prevailing in the company in question.

COST ACCOUNTING BY LINES OF PRODUCTS

The determination of costs and profits or losses by territories, salesmen, and sales orders is the most common form of distribution cost accounting, but it is possible to furnish management with valuable information by costing according to lines of products. Thus it is possible to segregate purchases, sales, and selling costs by classes of products and to determine the cost of procuring, handling, and selling and the net profit or loss for each line. Management can then push profitable lines and can discontinue or take measures to increase the profitableness of merchandise handled at a loss. In many concerns the analysis of costs is limited to subsidiary records in the form of analysis sheets, but in other companies a purchases, a sales, an inventory, and a profit and loss account for each line of products are included in the general ledger.

The problems encountered in classifying selling costs by lines of products are similar to those discussed in connection with the allocation of costs to territories and salesmen. Very few costs can be directly distributed, because most items of cost are incurred jointly for all products. Selling costs, which can be directly identified with a particular line of products, include: salaries of specialty salesmen, their commissions and travel; some forms of advertising; warehouse or storage; and depreciation of specialized equipment. The majority of the selling costs are of the general overhead type, which have to be allocated in accordance with an arbitrary base such as net sales. In this group are salaries of office personnel, officers' salaries, supplies, telephone and telegraph, water, and repairs to buildings and equipment. Although net sales is not a satisfactory distribution base for costs of a general nature, it is based on the ability-to-pay principle and is used frequently.

If a profit and loss analysis is maintained to accumulate sales, selling costs, manufacturing costs, and administrative costs for each line of products, a comparative product profit and loss statement, illustrated as Exhibit 115, can be prepared each month for management.

EXHIBIT 115
THE CONSOLIDATED MANUFACTURING CO.
COMPARATIVE PRODUCT PROFIT AND LOSS STATEMENT
Jan. 1 to Jan. 31, 19__

	Product A	Product B	Product C	Total
Gross sales	$29,000	$18,000	$21,000	$68,000
Less: sales returns and allowances	2,200	2,000	3,000	7,200
Net sales	$26,800	$16,000	$18,000	$60,800
Manufacturing cost of goods sold	$16,000	$14,000	$15,000	$45,000
Selling cost	3,000	1,200	1,800	6,000
Administrative cost	2,100	900	1,000	4,000
Total cost to make and sell	$21,100	$16,100	$17,800	$55,000
Net profit or loss	$ 5,700	$ *100**	$ 200	$ 5,800

* Loss.

COST ACCOUNTING FOR DEPARTMENT STORES

General Procedure. The first step in the process of installing a cost system in a department store should be the complete departmentalization of the enterprise into two groups or divisions, *viz.*, service departments and sales departments. Next it is necessary to devise business papers in such a way that transactions can be classified by departments and by lines of merchandise as they are recorded. Sales tickets should be marked with departmental numbers or symbols and prepared so as to indicate the class of merchandise sold; purchase orders and invoices should be designated so as to be identified with a particular department or class of merchandise; purchase and sales returns and allowance memorandums should be marked with the appropriate departmental figures; and, whenever possible, vouchers should be prepared to show the department served by the expenditure.

The records of original entry, such as the sales journal, voucher register, or purchase journal and cash disbursement journal combination, may be prepared with appropriate departmental columns so that transactions summarized from business papers can be classified by departments. During each accounting period, preferably a month, sales and purchase elements are recorded in journals of original entry and are classified by sales departments. Cost control accounts are used to summarize operating costs as they are posted from the voucher register or cash disbursement journal. As a part of the process of closing the books at the end of each accounting period, two groups of departmental accounts are opened, *viz.*, service departments and sales departments. The sales and purchase elements, already classified for each sales department, are closed into the newly opened departmental profit and loss accounts for each sales department. The closing inventory of merchandise is prepared by departments and is credited to the profit and loss account for each sales department, the debit being to a merchandise inventory account. At this stage of the closing process the profit and loss account for each sales department contains the purchase elements, the sales elements, and the closing inventory attributed to that department, the resulting figure being the gross profit for merchandise operations.

Each operating cost is analyzed and, whenever possible, is closed directly to accounts for service departments and to departmental profit and loss accounts. Many costs cannot be directly identified with departmental functions; hence it is necessary to select distribution bases which will affect as equitable allocation as possible. After operating costs have been distributed, the total cost of maintaining each service department and the partial cost of each sales department are obtained. The service departments are in existence to aid in procuring, storing, and selling merchandise so the total service departments' costs are transferable by means of distribution bases to the profit and loss accounts of sales departments. Thus the net profit or loss from operations is obtained for each department.

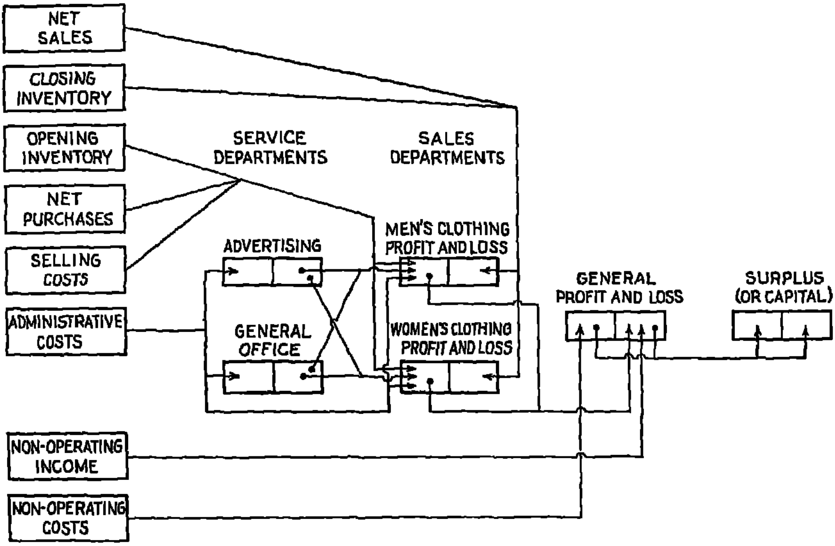
The profit and loss account for each sales department is closed into the General Profit and Loss account, to which has been transferred other income and cost items which have been independent of sales operations and not assignable to sales departments. The General Profit and Loss account, which exhibits the net profit or loss from all activities of the business enterprise, is closed into Earned Surplus or into the personal accounts of partners. The analysis of profit and loss is exhibited in a columnar statement known as a "comparative departmental profit and loss statement." Within each sales department, if a cost analysis of each line or class of merchandise is desired, the breakdown of costs and profits or losses may be recorded on analysis sheets which are subsidiary to the departmental profit and loss accounts.

Exhibit 116 shows the closing process when a system of cost accounting is used in addition to financial accounting.

Departmental Profit and Loss Statements. The monthly report to management regarding departmental operations and profits and losses may be in the form of a comparative departmental profit and loss statement. Two different types of statements may be presented. One form exhibits the cost of operating each service department as well as income and cost data for each sales department. This form of statement has the advantage of showing the total of each item of operating cost distributed to both service and sales departments. The total column exhibits the general profit and loss for the period in the same form that could be used if no departmental accounting had been undertaken. Exhibit 117 is illustrative of this form of statement.

Exhibit 116

Closing Process When Cost Accounting Is Used In Addition to Financial Accounting for a Department Store



A simpler form of statement which shows the income and cost items for each sales department but does not show the breakdown of cost for each service department may be used. In the total column the total costs of each type are not shown, because a portion of each has been assigned to service departments which are transferred to sales departments as a total sum. This statement has the advantage of being shorter, since the other form may have too many columns to be readily prepared.

EXHIBIT 117
VOGUE STORE FOR WOMEN
PROFIT AND LOSS STATEMENT
Month Ending Oct. 31, 19—

	Service departments			Sales departments						Total	
	General office	Accounting department	Advertising department	Ready-to-wear department		Millinery department		Lingerie department			
Sales					$15,000		$10,000		$5,000		$30,000
Deduct:											
Sales returns and allowances					500		200		100		800
Net sales					$14,500		$ 9,800		$4,900		$29,200
Cost of goods sold:											
Inventory, Oct. 1, 19—				$20,000		$18,000		$12,000		$50,000	
Purchases				12,000		8,000		5,000		25,000	
Freight-in				150		80		70		300	
Cartage-in				50		20		30		100	
				$32,200		$26,100		$17,100		$75,400	
Deduct:											
Purchase returns and allowances				1,000		500				1,500	
Inventory, Oct. 31, 19—				21,000		17,000		15,100		53,100	
Cost of goods sold					10,200		8,600		2,000		20,800
Gross profit					$ 4,300		$ 1,200		$2,900		$ 8,400
Selling costs:											
Advertising				$ 100		$ 150		$ 50		$ 300	
Salesmen's salaries				650		600		250		1,500	
Sales supplies				50		25		10		85	
Administrative costs:											
Salaries	$274	$220	$149	$ 230		$ 210		$ 152		$ 1,235	

EXHIBIT 117 (*Continued*)

	Service departments			Sales departments						Total	
	General office	Accounting department	Advertising department	Ready-to-wear department		Millinery department		Lingerie department			
Administrative costs (*Cont.*):											
Depreciation	$ 27	$ 28	$ 26	$ 32		$ 28		$ 14		$ 155	
Insurance	3	2	4	8		6		2		25	
Taxes	4	3	5	10		8		6		36	
Telephone and telegraph	5	10	3	7						25	
Office supplies	10	15	5	8		10		2		50	
Total direct costs	$323	$278	$192	$ 1,095		$ 1,037		$ 486			$ 3,411
Apportioned service department charges:											
General office	$323	35	28	85		100		75			
Accounting department		$313	43	90		110		70			
Advertising department			$263	$ 120		85		58			
Total sales department charges					$ 1,390		$ 1,332		$ 689		
Net operating profit or loss					$ 2,910		$ *132**		$2,211		$ 4,989
Nonoperating income:											
Interest income										$ 150	
Rental income										100	
Purchase discount										250	500
Nonoperating costs:											$ 5,489
Bad debts										$ 300	
Interest										50	350
Net profit											$ 5,139

* Loss.

Analysis and Interpretation of Departmental Statements. In order to analyze departmental statements effectively, it is necessary to resort to the common device of reducing figures to percentages or ratios. It is a common practice to prepare a column of percentages, based on net sales, for each sales department of the business enterprise. For example, the percentages given below for the millinery department of the Vogue Store for Women, Exhibit 117, could be prepared for each department and for the total income and cost data for all departments:

Millinery department	Amount	Percentage *of sales*
Net sales	$9,800	100.00
Cost of goods sold	8,600	87.76
Gross profit on sales	$1,200	12.24
Selling costs	$ 775	7.91
Administrative costs	262	2.67
Apportioned service department charges	295	3.01
Total department costs	$1,332	13.59
Net loss for month	$ 132	1.35

A careful analysis of the comparative data for each department by months and years is valuable in determining trends. The cost accountant can watch the trend of sales and sales returns for each sales department from month to month and can compare these data with the corresponding month in preceding years. The percentage of gross profit, *i.e.*, the margin or markup, is of particular interest in merchandising enterprises. For example, in cafeteria and restaurant operation it is a common practice to keep the cost of food sold under 50 per cent of the sales dollar. Various "operating ratios" may be computed for each department. These include the computation of the percentage of each type of cost to net sales. Thus individual items such as executive salaries, selling costs, utilities, rent, and delivery costs, may be studied in relationship to net sales.

In concerns where there are similar operating conditions for several departments, the preparation of operating ratios facilitates the comparison of departments each month, thus permitting management to rectify unfavorable conditions in some departments and encourage and reward managers of those departments where satisfactory operating conditions exist.

COST ACCOUNTING BY LINES OF MERCHANDISE IN RETAIL ESTABLISHMENTS

The determination of costs and profits or losses by departments is the most satisfactory form of cost accounting in retail establishments, but, in retail concerns which are too small to make departmentalization practical, it is possible to furnish management with valuable information by costing according to lines of products. Thus it is possible to segregate purchases, sales, and operating costs by classes or lines of merchandise sold and to determine the cost of procuring, handling, and selling and the net profit or loss for each line. Management can push profitable lines and can discontinue or take measures to increase the profitableness of merchandise handled at a loss. The analysis of purchases, sales, and operating costs by line of merchandise should permit management to determine the merchandising efficiency of each line. The plan can be used effectively in concerns such as small lumber companies, automobile service stations, and men's or women's clothing stores. In some concerns the analysis of costs is limited to subsidiary records; no sales, purchases, inventory, operating costs, or profit and loss accounts for lines of merchandise appear in the general ledger. It is assumed for purposes of illustration in the succeeding sections that a purchases, a sales, an inventory, and a profit and loss account for each class of merchandise are included in the general ledger.

General Procedure. The first step in determining costs is to establish definite lines or classes of merchandise or service. In a retail lumberyard stocks of goods can be divided into lumber, millwork, hardware, paint, glass, coal, and cement. In a service station it is possible to classify merchandise and service into gasoline, oil, tires and tubes, accessories, battery service, and greasing service. The business papers, composed primarily of purchase records and sales tickets, are prepared so that purchases and sales are segregated by classes of merchandise or service. Columns may be added to the purchase journal or to the voucher register to summarize purchase transactions by classes of products, and the sales journal may be arranged so as to summarize sales by classes. General ledger accounts or subsidiary accounts are used to record postings of purchase and sales elements from records of original entry by classes of products. Operating costs are recorded in the cash disbursement journal or voucher register and are posted to regular operating cost control accounts. At the end of each month, inventory is taken of merchandise on hand by lines of products, adjusting entries are made to account for unrecognized expense and income elements, and journal entries are made to close the books. The closing process consists of transferring the opening inventories, net purchases, net sales, and the closing inventories to the profit and loss account for each class of merchandise or service. Operating costs must be analyzed and distributed either directly or by distribution bases to the profit and loss accounts. The profit and loss account for each class of merchandise shows the net profit or loss realized from sales of that line. The various profit and loss accounts are closed into the General Profit and Loss account which exhibits the net profit or loss from all activities of the business. A comparative profit and loss statement which presents costs and profits or losses by lines of products may be prepared (Exhibit 118). The profit and loss data for lines of products or services may be reduced to percentages of net sales which may be analyzed by the cost accountant in the manner explained in the preceding section dealing with departmental costs.

EXHIBIT 118
THE CENTRAL LUMBER AND HARDWARE CO.
PROFIT AND LOSS STATEMENT
Month Ending Oct. 31, 19—

	Lumber		Hardware		Coal		Total	
Sales		$10,000		$8,000		$5,000		$23,000
Deduct:								
Sales returns and allowances		400		100				500
Net sales		$ 9,600		$7,900		$5,000		$22,500
Cost of goods sold:								
Inventory, Oct. 1, 19—	$20,000		$10,000		$ 2,000		$32,000	
Purchases	15,000		8,000		8,000		31,000	
Freight-in	750		50		1,000		1,800	
Trucking-in	50		15				65	
	$35,800		$18,065		$11,000		$64,865	
Deduct:								
Purchase returns and allowances			15				15	
Inventory, Oct. 31, 19—	29,500		12,050		7,000		48,550	
Cost of goods sold		6,300		6,000		4,000		16,300
Gross profit		$ 3,300		$1,900		$1,000		$ 6,200
Selling costs:								
Advertising	$ 100		$ 150		$ 150		$ 400	
Salesmen's salaries	480		395		250		1,125	
Sales supplies	10		15		5		30	
Trucking-out	175		25		200		400	
Administrative costs:								
Office salaries	150		125		125		400	
Officers' salaries	200		180		150		530	
Depreciation	25		15		10		50	
Degradation (coal)					80		80	
Heat	10		25		5		40	
Light and power	15		25		5		45	
Insurance	12		8		6		26	
Taxes	18		16		14		48	
Telephone and telegraph	8		12		4		24	
Office supplies	10		4		6		20	
Total operating costs		1,213		995		1,010		3,218
Net operating profit or loss		$ 2,087		$ 905		$ *10**		$ 2,982
Nonoperating income:								
Interest income							$ 125	
Purchase discount							300	425
								$ 3,407
Nonoperating costs:								
Bad debts							225	
Interest							100	325
Net profit								$ 3,082

* Loss.

CHAPTER XX

STANDARDS FOR DISTRIBUTION COSTS

It may seem difficult, in the present stage of development of managerial and cost accounting technique, to develop a system of standard costs in the distribution and administrative divisions which will compare with the minute systems in use in manufacturing divisions. Executives do not question the need for standards as a means of controlling distribution and administrative costs, but they recognize the difficulties encountered in controlling these costs. In fact, if it were a question of choosing between the introduction of a standard cost system in the manufacturing division and in the sales division, the latter would probably be selected. The sales division of enterprises which distribute their own products is generally the most difficult of the three divisions to control. In factories the activities of men and machines can be closely related, and their work can be carefully timed so as to prevent wide variations from efficient production. Piece-rates for all classes of direct workers and inspections of completed work at each stage of production can be provided as a means of increasing efficiency, and standards can be used effectively as a supplementary aid to these two managerial devices.

In the distribution divisions management does not have so effective means of control as exist in the manufacturing departments. There appears to exist a type of freedom, fewer restrictions, and less check on the hourly and daily activities of office workers, salesmen, and executives. Accompanying the lack of minute control, waste, extravagance, and uneconomical use of equipment and of employees' time tend to develop, and unnecessary costs are incurred. Consequently the development of cost standards in the distribution divisions seems highly desirable.

Standards for use in nonmanufacturing divisions become both possible and practical when a complete system of budgetary control is in use. The term "standard" in its full meaning goes beyond the "standard cost" concept as originally applied to manufacturing costs. The principles underlying the development of standards can be applied to all functions of the business enterprise and can be made to include many activities in the selling divisions.

Standard distribution costs can be so prepared that a standard cost analysis can be made of each distribution cost unit, including sales territories, salesmen, lines of products, and in some cases sales orders and jobbers. Since selling costs vary in each sales territory, there can be standards established that permit the preparation of a separate profit and loss statement for each territory in advance of the accounting period. The standards set from the budget estimates must be reasonable and possible of attainment. Since many of the standards are not permanent, new standards may be necessary for some distribution costs for each budget period to meet the changing internal and external business conditions. The important objectives should not become obscure. Standards should be determined in such a way that they express with a reasonable degree of accuracy the amount of each sales dollar that *should* be attributable to manufacturing costs, distribution costs, and administrative costs.

Standards Vary in Extent and Completeness. Almost every sales organization has some form of standards in use, but the extent to which standards can be applied to various phases of an organization depends upon the type of enterprise and the degree to which standardized practices have been adopted. In the majority of cases the standards are not incorporated in the accounting records; they are used simply as a means of checking the operating efficiency of individuals or of groups within the sales organization. For example, one concern may limit its use of standards to the determination of a sales quota for each salesman and an advertising appropriation for each product for each sales territory; a second concern may prepare elaborate schedules of standards which apply to every type of selling cost, to every sales department and territory, to each salesman, and to each product or line of products.

The channels of distribution of the product may be an important determinant in the extent to which standards are used. Enterprises which sell their entire output to a few jobbers, to chain organizations, or to manufacturing concerns are less likely to require standards as a means of measuring the efficiency with which the distribution functions are performed than are enterprises which perform all the functions of marketing their products either directly to consumers through their own salesmen or through retailers. The more complex the sales organization, the greater is the need for standards as a means of managerial control.

Setting Standards for Sales. The determination of a standard sales volume is the starting point in the establishment of standards for distribution costs, because the standard sales volume is the basis for the computation of selling costs required to market the quantity of products set as the goal. The sales budget establishes the standard sales for the period. Past, present, and forecasted future conditions within the business organization, in the industry, and in new and old trade territories must be considered. The estimated sales as shown in the sales budget may be the standard volume; or the incorporation of standard cost procedure may result in the sales estimates being increased over anticipated amounts for some territories, salesmen, or products.

The standard sales budget should show estimates of the expected sales for the period, generally 6 months to 1 year in length, for classes of products for each territory or branch, for each salesman, and in some cases for each customer. After the standard sales volume is determined for each sales unit, a definite basis has been established for the derivation of cost standards for each sales unit of the distribution process.

Sales Quotas. The most common form of standard for territories or branches and salesmen is the sales quota. The sales quota is a standard by which management can measure actual accomplishments of the sales personnel in comparison with sales possibilities. It is a form of standard which, when scientifically determined, is a stimulus to salesmen and to sales executives. Sales quotas serve the same purpose for the sales division that piece-rates and scientific wage systems contribute to the factory.

Various forms of sales quotas are in use. They may be expressed in terms of quantities of products, in dollars, or in points, each point representing a sum such as $25 worth of merchandise. They may apply to the sum of all products, or they may be determined for individual products. If the quotas are to be effective standards, they must be both reasonable and possible of attainment. After quotas have been set, they should be changed only when there are important changes in conditions which invalidate them.

Setting Standard Budgets for Selling Costs. The procedure for determining standard budgets for selling costs is similar in plan to that used for standard overhead budgets in the manufacturing division. It involves building a budget of standard selling costs by type, the allocation of the standard selling costs to sales service departments and sales territories, the reapportionment of standard costs for the sales service departments to sales territories, and the selection of a functional unit or units to measure the activities of each department and territory.

Standard selling cost budgets should be so prepared that they show a classification such as to fixed and variable charges. The fixed costs, which include items as depreciation, taxes, insurance, and rent of sales offices, may be carefully inspected to see that they have been properly computed. Since they are fixed in amount, regardless of increases or decreases in sales volume, they constitute standards for the budget period.

It is in the case of variable selling costs that the determination of standards has the greatest value. Variable costs include various types of advertising; selling salaries, commissions, and bonuses; travel; telephone and telegraph; postage and supplies; losses on bad debts; repairs to cars and trucks; and shipping and delivery costs. These costs assignable to sales service departments, sales territories, and in some cases to salesmen and customers' accounts, are subjected to a rigid examination, and a standard in terms of a functional unit or units may be determined for each department, territory, product, salesman, or account.

Sliding-scale Budgets. In many business enterprises it is difficult to forecast accurately the sales volume for 6 months or 1 year in advance. Aware of this difficulty, some executives contend that it is futile to attempt to set sales quotas and to determine standards for selling costs. Others advocate the use of standards in connection with sliding-scale budgets which are employed in the distribution division of the business enterprise in a manner similar to those used in the manufacturing division.

The plan is to set two or more levels of sales volume. For example, $100,000 may be forecasted as the highest possible sales volume that could be obtained by the sales division and $60,000 may be set as the lowest possible limit; between the two extremes one or more levels of sales volume may be determined. The problem is to prepare standard selling cost budgets which contain detailed estimates of selling cost for sales service departments, territories, and perhaps salesmen, for each level of sales volume. If a territory achieves the maximum sales quota assigned to it, the standard selling cost budget applicable to the first level of sales volume would be applied; if the sales for the territory are in the lowest level of sales volumes, then the territory is expected to keep its selling costs within the limits set in the standard selling cost budget for that level of sales activity. The same plan is followed in matching the standard selling costs against intermediate levels of sales volumes.

Determining Unit Standards for Distribution Costs. The distribution functions of the majority of business enterprises are more varied and less uniform than are those of manufacturing divisions. Therefore unit standards for various types of sales activities cannot be determined so accurately as manufacturing cost standards, nor can they be so completely applied. No units of measuring activities can be found for some types of selling costs, while in other cases the functional units selected are not entirely satisfactory; as a result the standards are not always effective measurements of distribution efficiency. It is a common practice to determine standards for those selling costs and sales divisions which perform functions that can be easily standardized and to eliminate from standardization those in which there is little or no uniformity in activities. Particular costs of divisions in the latter classification may be subjected to special investigation on occasions, but the derivation of standard unit costs is not a regular practice.

A publication of the U.S. Department of Commerce entitled "Distribution Cost Accounting for Wholesaling" gives the following list of functions and their corresponding service units which have been used in actual analyses of distribution costs:[1]

Function	Service Unit
Assembling and checking orders.	The order or the invoice line or the volume unit.
Carrying (financing):	The dollar of inventory.
Cash receiving.	The customer month.
City delivery.	The truck mile or hour or the order or invoice line or the unit of goods sold for city delivery.
Credit and collection.	The customer.

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[1] TAGGERT, H. F., "Distribution Cost Accounting for Wholesaling," pp. 10–13, U.S. Department of Commerce, Washington, D.C.

Function	Service Unit
Dealers' helps.	The customer.
Delivery of country shipments to station.	The merchandise unit.
Direct mail advertising.	The mail solicitation.
Filling orders.	The invoice line.
Getting out stock for orders.	The invoice line.
Handling.	The invoice line.
Haulage (receiving and shipping truckage).	The hundredweight.
Keeping stock records.	The invoice line.
Maintaining order and letter files.	The order or letter.
Merchandise storage.	The square foot or cubic foot of storage space provided or used.
Packing and loading.	The merchandise unit or the order or the volume unit.
Posting invoices to customers' accounts.	The order.
Preparation and mailing of customers' statements.	The customer.
Preparation of invoices and shipping documents (except pricing and extending).	The order.
Pricing and extending invoices.	The invoice line.
Receiving and posting cash receipts.	The individual cash collection.
Receiving stock.	The volume unit.
Sales analyses and statistics.	The invoice line or the order.
Salesmen's compensation.	The call.
Salesmen's equipment.	The call.
Salesmen's telephoning.	The call.
Salesmen's travel.	The day or mile traveled.
Stenciling or labeling orders.	The order.
Traffic and claims.	The order.
Transportation of country shipments (freight, express, postage).	The thousandweight-mile.

In discussing the utility of the functional analysis, budgets, and standards, the bulletin explains:

> At this stage or level of analysis the emphasis is still on the uses of cost accounting for the internal control of operations. Many of the functions and units above listed are useful also in translating functional costs into departmental or territorial or other types of cost, but their primary utility is for the management in conducting the internal affairs of the organization in an intelligent and efficient way. The principal way in which these functional analyses are useful for this purpose lies in their employment for the preparation and administration of standards and budgets.
>
> Planning of sales activities can best be done in terms of the operations to be performed—the telephone and personal calls to be made by salesmen, the number of mail solicitations, the orders to be received, recorded, filled, packed, loaded, and delivered, the invoice lines to be written, priced, and extended, and so forth and so on through all the processes required in acquiring and disposing of the

goods which it is intended to sell. On the basis of experience and the analysis of operating functions a standard cost for each operation can be determined. This standard does not merely reflect what the cost has been in the past but what it ought to be in view of expected wage rates, labor efficiency, and other circumstances.

The budget is made up in terms of the expected number of operations of every type involved in expected sales, and the standard unit costs of these operations. Then as actual sales, operations, and cost appear, actual costs can be compared with budgeted costs in such a way as to show how much of the difference can be accounted for by increased or decreased requirements for services and how much is chargeable to increase or decrease in unit costs. It is the latter cause of difference, of course, which requires the attention of management.

For example, suppose that the standard cost per item or invoice line for getting out stock for orders is 1.5 cents. If selling plans for the coming month call for 100,000 item sales, the total budgeted cost for this activity is $1,500. On this basis the financial plans for the month are prepared. Actual item sales, let it be assumed, total 110,000, and the actual cost of getting out stock is $1,600. The increase in cost is only 6⅔ per cent, with an increase in activity of 10 per cent. On a standard cost basis the cost would have been $1,650. Evidently $50 has been saved through improved efficiency in carrying out the function. If, on the other hand, item sales had been 90,000, and actual cost had been $1,450, a failure to attain expected efficiency would have been evident, with resulting "loss" of $100 (derived by subtracting the standard cost of the actual units of service, $1,350, from the actual expenditure).

In order that this device may attain the maximum usefulness the functions and units of service must be most carefully chosen. The functions must be really homogeneous, and the units must be significant measures of the variability of their costs. Fixed items, such as supervision and space costs, must be separately dealt with. This does not mean, of course, that functions and units can be so devised that the cost can be expected to vary completely and perfectly with the difference in the number of service units, and it may be in some cases that the only solution will be "sliding scale" unit cost standards—that is, standard costs which are adjustable to changes in volume. In some cases the budget must presumably be fixed, since such costs as top supervision and the costs of furnishing space do not vary within wide limits of increased or decreased business activity. The conditions in each case will indicate to what extent the procedure must be varied in order to obtain the greatest possible benefit.

A discussion of unit standards for distribution costs is necessarily incomplete unless it is applied to a particular business enterprise which has its own peculiar problems, so only a general description of the preparation of standards for selling costs is given in the sections which follow.

Advertising Costs. A complete analysis of the advertising program for the budget period in terms of estimated sales should result in setting a standard advertising cost appropriation for each type of advertising for each sales territory, each unit, and in some cases for each dealer or customer's account.

Newspaper and magazine advertising plans can be reduced to the amount of space used and the publication rate for each periodical. Generally the appropriation is determined as a percentage of the expected sales of the concern. The standard appropriation for newspaper advertising may be supported by a schedule showing the amount allotted to each periodical in each territory for each month or season.

In a similar manner, appropriations which will constitute the standard allowance for the period are specified for radio and billboard advertising. A percentage of estimated sales may be determined for each form of advertising, after which the separate appropriations can be further subdivided into separate allotments for each territory.

The standard appropriation for dealers' helps, which include placards and display material, demonstrations, and window and store arrangement service, is determined after a study has set the amount of service each dealer is to receive and its cost has been estimated. The cost per dealer multiplied by the number of dealers equals the standard allowance for dealer help for the period.

The standard cost for catalogues is determined by computing the cost per catalogue and by multiplying this amount by the number of catalogues to be distributed to dealers or to customers in each territory. The number of active and prospective dealers and customers is estimated from a careful analysis of conditions in each territory.

Selling Salaries. In determining a standard allowance for selling salaries for the budget period, the management of a business enterprise will subject the entire sales organization to a rigid examination. The work done by each employee in each sales department and sales territory is examined, and a contraction or expansion in sales personnel is planned in order to launch successfully the sales program set up in the standard sales budget. The result of the survey is the preparation of a schedule showing the personnel requirements, classified by positions, and the standard salary allowance for each class for each sales department and territory. It is expected that the standard selling salaries budget will be followed explicitly during the period, unless there is a change in the sales program.

Sales Commissions and Bonuses. Sales commissions and bonuses are set as a percentage of sales or as an amount per unit of product. A standard schedule of commissions and bonuses should be prepared in advance of the budget period, and should be applied to all salesmen consistently and uniformly throughout the period. The amount offered as an incentive to salesmen and sales executives is the result of executive decision, after consideration of such factors as the selling price of products, competitive conditions, salaries paid to salesmen, stage of territorial development, and the experience and training of salesmen.

Travel. Even if business enterprises do not develop standards for all types of selling costs, generally they employ standard allowances for travel. A manual or regulation sheet is prepared to show standard allowances for each item of traveling cost. A standard rate per mile is set for all travelers; state or national mileage charts are used to check distances between cities; and per diem rates are set for meals and lodging.

Sometimes maximums are set for each type of travel. The regulations also cover such items as gratuities, repairs to cars, entertainment, and emergency purchases of supplies.

In preparing the standard budget for travel, it is necessary to study each territory and to estimate the number of miles each salesman and supervisor will travel to accomplish his sales quota. This may be a general survey, or it may be made in such detail as to include a schedule of each salesman's route in miles and the number of calls to be made each day. The number of salesmen days and miles multiplied by the standard travel allowances provides the total standard budget appropriation for travel.

Supplies. A standard allowance for supplies for each sales office, sales territory, and salesman is frequently difficult to determine, but a knowledge of amounts used during past periods and of the requirements for each sales unit makes possible the setting of standards for this variable selling cost. Such sales departments as advertising, sales promotion, general sales, credit, collection, shipping, and sales correspondence can be requested to prepare a list of the supplies to be required during the period. This list can be carefully scrutinized in terms of the functions performed and the sales work to be accomplished, and a standard budget allowance can be set for each department.

The supply requirements for each territory and each salesman can be estimated rather accurately. In some cases samples, display materials, and catalogues can be listed in terms of salesmen; each territory may have supply needs that can be accurately estimated; and estimates of stationery, stamps, and other forms of supplies can be prepared for both groups. Thus a standard allowance can be made for each type of supply for each sales unit. Generally this results in more effective and more economical use of supplies.

Telephone and Telegraph Charges. Unless some control is exercised over the sales personnel, extravagance tends to exist in incurring telephone and telegraph costs. Many enterprises require that a form be prepared for each call and telegram to show the purpose and importance of the message, and such a practice aids in discouraging unnecessary incurrence of such costs. Past experience and a knowledge of conditions within each sales department and territory should make possible the preparation of standard allowances for telephone and telegraph charges for each sales unit.

Receiving, Shipping, Delivery, and Warehouse Costs. These costs are as difficult to standardize as are any in the group of variable selling costs because, if these functions are performed by a single department, conditions of joint costs exist. If the functions and costs can be separated, it is possible to determine a standard cost for each unit of service performed. The following schedule of receiving, shipping, delivery, and warehousing suggests possible unit standards which can be computed:

Cost Classification	Standard Unit of Measurement
Receiving	Cost per piece, per pound, or per shipment
Warehousing	Cost per cubic foot
Packing	Cost per piece, per order, or per pound packed
Loading	Cost per piece or per hundred pounds
Delivery	Cost per mile or per ton-mile of deliveries

A detailed study should be made of the above costs in order to determine whether or not they represent efficient operation; an analysis of the work performed in terms of units of measurement permits the setting of standard costs for each unit of work done. The standard cost per unit for each service can be used as a means of measuring the efficiency of the department or departments performing the service during the budget period.

Need for Standards for Sales Territories. In devising a standard cost accounting system for a concern for its three divisions of manufacturing, selling, and administration so that it will be possible to charge a standard amount of selling cost, representing sales activities, to each dollar of sales or to each unit of the product sold, it is necessary to determine a distribution rate per dollar of sales or per unit of the product for each territory.[1] The use of standard selling cost rates enables management to control selling policies and methods and to know the standard amount of selling cost incurred on each sales order for each territory from day to day. Thus if the enterprise maintains a complete standard cost system, the management may know immediately after the sale of an order in a particular territory the standard cost of manufacturing, the amount of standard selling and administrative costs applied to the order, the total standard cost to make and sell, and the net profit on the order, computed on the basis of standard costs.

In some companies where orders involve large amounts, such an analysis would prove valuable for every order sold for each territory. In other concerns it is more practical to compute these standard costs and profit elements only on the large orders and to make tests by computing the costs on every tenth small order in each territory.

To provide for the daily computation of standard costs on orders to be shipped into each territory, the amount of selling cost must be applied to each order by means of standard application rates. In order to arrive at a satisfactory basis for determining the amount of selling costs that should be applied to an order:

a. A budget must be prepared for each territory, showing the total standard selling costs.

b. The standard sales for each territory must be determined.

c. Rates for allocating selling costs must be computed for each territory.

d. The accounting treatment to record the amount of standard selling costs applicable to particular orders must be considered.

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[1] Standard administrative costs are discussed in Chap. XXI.

Standards for Sales Territories. After a standard budget has been prepared to exhibit the estimate of selling costs for the budget period, the standard selling costs can be reclassified and apportioned so as to show the standard selling cost budget for each sales territory. Generally the standard selling costs for each territory appear in a supporting schedule to the summary standard selling cost budget and were actually estimated as a step in the preparation of the summary budget. As each item of cost such as advertising, selling salaries, commissions and bonuses, and supplies was analyzed preparatory to the determination of the budget figure, the conditions existent in each sales territory were considered.

One basis for the computation of territorial application rates is standard sales. The basis of allocating selling costs to sales orders is obtained by dividing the total standard selling costs for each territory by the total standard sales for that territory. For example, if the total standard selling costs for Texas for the budget year, as shown in the territorial standing order for Texas, were $100,000 and the standard sales for Texas for the same period were $500,000, the application rate for Texas would be obtained by the following formula:

$$\frac{\text{Total standard selling costs for Texas for budget period}}{\text{Total standard sales for Texas for budget period}} = \frac{\$100{,}000}{\$500{,}000}$$

$$= 20 \text{ per cent, the standard selling cost rate for Texas}$$

The amount of standard selling cost applied to each sales order and subsequently shown in the territorial standard profit and loss statement should be a normal amount. Normal rates are necessary because both selling costs and sales for each territory may vary considerably from month to month, especially in seasonal industries. The normal period is deemed to be the concern's cycle of business activities, which is usually 1 year. The standard application rates should cover a normal period, preferably 12 months, since the year is usually the fiscal period for which advertising and other selling appropriations are made and since it covers a complete cycle of seasonal variations in both sales and selling costs. The normal rate is determined by adding together the standard monthly selling costs and dividing the total by the sum of the monthly standard sales for the territory.

The standard rate may be used as each sales order is received. For example, if Jones, a salesman in the Texas territory, sends a sales order to the home office for $300 and the standard selling cost rate for Texas is 20 per cent, the amount of $60 is added to the standard manufacturing and administrative costs; thus the computation of the standard cost to make and sell and of the profit or loss is made possible, as shown in Exhibit 119.

The use of normal standard rates results in the amount of standard selling cost transferred to territorial profit and loss accounts being more or less than the actual selling costs incurred during a given month. This condition is illustrated in Exhibit 120 for the Texas territory for a budget

EXHIBIT 119

ANALYSIS SHEET OF PROFIT AND LOSS ON SALES ORDERS

Territory: Texas

Standard selling cost application rate: 20% of sales

Date	Sales invoice No.	Salesman	Standard manufacturing cost	Standard selling cost	Standard administrative cost	Total standard cost	Sales price	Profit or loss (based on standard costs)
Jan. 5	1061	Jones	$160	$60	$20	$240	$300	$60
			$160	$60	$20	$240	$300	$60

EXHIBIT 120

COMPARISON OF APPLIED AND ACTUAL SELLING COSTS FOR A TERRITORY FOR A 6-MONTH PERIOD

Texas Territory

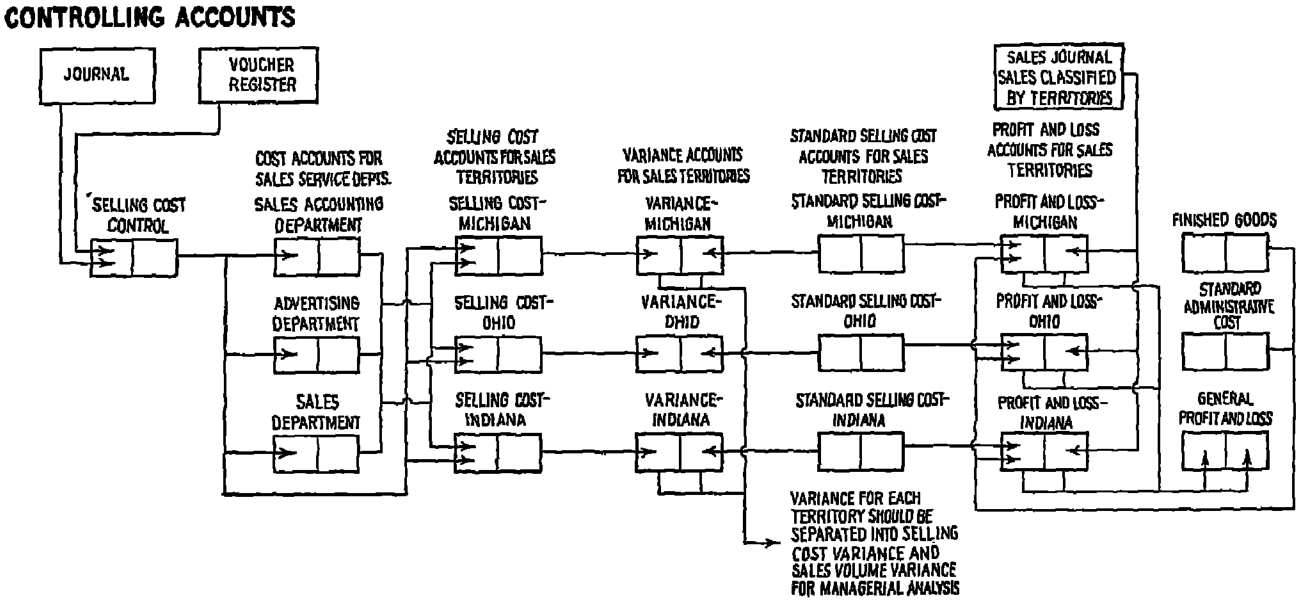
Budget period: 6 months

Month	Actual sales	Standard application rate, %	Standard selling cost applied	Actual selling cost	Monthly variance	
					Over	Under
January	$ 50,000	20	$ 10,000	$ 15,000	$ 5,000	
February	45,000	20	9,000	12,000	3,000	
March	60,000	20	12,000	16,000	4,000	
April	75,000	20	15,000	18,000	3,000	
May	110,000	20	22,000	20,000		$ 2,000
June	160,000	20	32,000	19,000		13,000
Total	$500,000		$100,000	$100,000	$15,000	$15,000

period of 6 months. It will be noticed that in May and June the sales reached the peak for the budget period and the standard selling cost applied was greater than the actual cost; the first 4 months it was less than the actual. If actual selling costs conform to standards, there should be no difference between actual and applied standard cost at the end of the budget period.

EXHIBIT 121

A SYSTEM OF ACCOUNTING FOR STANDARD AND ACTUAL DISTRIBUTION COSTS


CONTROLLING ACCOUNTS
JOURNAL
VOUCHER REGISTER
SELLING COST CONTROL
COST ACCOUNTS FOR SALES SERVICE DEPTS.
SALES ACCOUNTING DEPARTMENT
ADVERTISING DEPARTMENT
SALES DEPARTMENT
SELLING COST ACCOUNTS FOR SALES TERRITORIES
SELLING COST-MICHIGAN
SELLING COST-OHIO
SELLING COST-INDIANA
VARIANCE ACCOUNTS FOR SALES TERRITORIES
VARIANCE-MICHIGAN
VARIANCE-OHIO
VARIANCE-INDIANA
STANDARD SELLING COST ACCOUNTS FOR SALES TERRITORIES
STANDARD SELLING COST-MICHIGAN
STANDARD SELLING COST-OHIO
STANDARD SELLING COST-INDIANA
VARIANCE FOR EACH TERRITORY SHOULD BE SEPARATED INTO SELLING COST VARIANCE AND SALES VOLUME VARIANCE FOR MANAGERIAL ANALYSIS
SALES JOURNAL SALES CLASSIFIED BY TERRITORIES
PROFIT AND LOSS ACCOUNTS FOR SALES TERRITORIES
PROFIT AND LOSS-MICHIGAN
PROFIT AND LOSS-OHIO
PROFIT AND LOSS-INDIANA
FINISHED GOODS
STANDARD ADMINISTRATIVE COST
GENERAL PROFIT AND LOSS

Accounting for Standards for Sales Territories. If standards for distribution costs are to be incorporated into the general ledger accounting system, two additional accounts, a variance account and a Standard Selling cost account, may be used for each territory in connection with the actual distribution cost accounting system explained in Chap. XIX and illustrated as Exhibit 106, shown on page 378.

A system of accounting for standard and actual distribution costs is shown in Exhibit 121. During the accounting period as orders are received from territories, the Standard Selling Cost account for each territory is credited and the Profit and Loss account for the territory is debited for the standard amount of selling cost applied to orders. Likewise the Profit and Loss account for each territory is credited for the net sales for sales orders for the territory and is debited for standard manufacturing and administrative costs chargeable to goods sold. At the end of the accounting period, the balance of the Profit and Loss account for each territory, which represents the profit or loss computed on the basis of standard costs, is closed into the General Profit and Loss account.

Actual selling costs incurred during the period and those costs recognized as adjustments at the end of the period are charged first to a Selling Cost Control account and subsequently, as a function of the closing process, are charged to selling cost accounts for sales territories. A variance account is used for each territory to show the difference between the actual selling cost account for each territory, which has a debit balance, and the standard selling cost account for each territory, which has a credit balance.

Exhibit 122 is a statement showing standard selling costs, standard sales quotas, and a standard selling cost application rate for each of three sales territories.

Computation and Analysis of Variance from Standard Costs for Territories. In Exhibit 121, page 414, the variance account for each territory is used as a control account, and the balance should be analyzed in order to determine various causes of the variance for the period. Each variance, which represents the difference between the actual selling costs and the standard selling costs applied to actual sales for each territory, may be separated into a *selling cost variance* and a *sales volume variance.*

The selling cost variance is computed by extracting the difference between the actual selling costs and budgeted standard selling costs for the period. The sales volume variance is computed by obtaining the difference between the actual sales and the standard budgeted sales and multiplying this amount by the standard selling cost application rate. The computation of the two variances for a sales territory is illustrated as follows.

The standard selling cost application rate for January for the Indiana territory is obtained by the following formula:

$$\frac{\text{Standard selling costs for Indiana for January}}{\text{Standard sales for Indiana for January}} = \frac{\$4{,}500}{\$30{,}000} = 15 \text{ per cent}$$

EXHIBIT 122

MID-WEST HARDWARE CO.

STATEMENT OF STANDARD SELLING COSTS, SALES QUOTAS, AND STANDARD APPLICATION RATES FOR TERRITORIES

Year ending Dec. 31, 19—

Selling costs	Standard units	Michigan			Ohio			Indiana			Total		
		Units	Per unit	Amount	Units	Per unit	Amount	Units	Per unit	Amount	Units	Per unit	Amount
Variable costs:													
Advertising—catalogues	Number of catalogues	14,000	$ 0.20	$ 2,800	8,500	$ 0.20	$ 1,700	9,500	$ 0.20	$ 1,900	32,000	$ 0.20	$ 6,400
Advertising—dealer helps	Number of dealers	200	25.00	5,000	150	25.00	3,750	175	25.00	4,375	525	25.00	13,125
Advertising—newspaper	5 % of sales			7,500			5,000			5,750			18,250
Salesmen's commissions	1 % of sales			1,500			1,000			1,150			3,650
Auto travel	Mileage	50,000	0.05	2,500	40,000	0.05	2,000	42,000	0.05	2,100	132,000	0.05	6,600
Meals and lodging	Per diem	1,200	4.00	4,800	900	4.00	3,600	1,000	4.00	4,000	3,100	4.00	12,400
Delivery truck operations	Miles	20,000	0.10	2,000	15,000	0.10	1,500	18,000	0.10	1,800	53,000	0.10	5,300
Shipping costs	Number of products	2,500	1.00	2,500	1,800	1.00	1,800	2,000	1.00	2,000	6,300	1.00	6,300
Fixed costs:													
Salaries—sales managers	Number of employees	1	4,000	4,000	1	3,000	3,000	1	3,500	3,500	3		10,500
Salaries—salesmen	Number of salesmen	4	1,200	4,800	3	1,200	3,600	3	1,200	3,600	10	1,200	12,000
Rent of branches	Rental contracts			1,500			1,200			1,000			3,700
Depreciation of equipment	10 % of cost of equipment			1,200			600			800			2,600
Home office selling costs	Distributed on basis of sales quotas			8,220			5,480			6,300			20,000
Total standard selling costs				$ 48,320			$ 34,230			$ 38,275			$120,825
Sales quota				$150,000			$100,000			$115,000			$365,000
Standard selling cost application rate per dollar of sales, per cent				32.21			34.23			33.28			

Actual sales for January, $35,000.
Actual selling costs for January, $5,000.
Standard selling costs applied to sales orders and charged to the Profit and Loss account for Indiana, $5,250 (15% of actual sales of $35,000).
Variance between actual and applied standard selling costs, $250, a credit balance.

Selling cost variance computation:

Actual selling costs, $5,000 − budgeted standard selling costs, $4,500, = $500, selling cost variance, representing a debit in the Variance—Indiana account.

Sales volume variance computation:

Actual sales, $35,000 − standard sales, $30,000 = $5,000, variance in sales.

$5,000, variance in sales × 15%, standard selling cost application rate = $750, sales volume variance, representing a credit balance in the Variance—Indiana account.

Investigation and Disposition of Variances from Standard Costs for Sales Territories. The analysis of the selling cost variance for each territory in terms of *selling cost variance* and *sales volume variance* permits management to investigate each cause of variances, so that steps can be taken to correct unfavorable conditions which are within the control of executives in charge of sales operations. The investigation of the selling cost variance should disclose the items of selling cost which exceed the standards in the budget schedule. Executives responsible for costs in excess of budget authorizations for controllable costs, such as supplies, salaries, travel, entertainment, advertising, and telephone tolls, should be requested to explain these inefficient operations and to keep within budget allowances in the future. If the standards are disclosed to be unreasonable or conditions in a territory have changed since their preparation, a revision of standard budgets is in order for the remaining months of the fiscal period. Some or all of the variance may be considered to be the result of seasonal conditions if normal selling cost application rates are used for the year.

The investigation of the sales volume variance should disclose the causes of any differences between actual and standard sales in terms of dollars and units of products sold. The fault may lie with salesmen and sales supervisors, with ineffective advertising and sales promotion, with local business disturbances, such as a crop failure or an industrial labor dispute, with unexpected competition, or with poor budgeting. It is the obligation of management to separate the controllable and uncontrollable causes and to take action to correct conditions over which the executives have supervision.

To the extent that variances have resulted from various forms of inefficiency or a better than standard performance, they should be transferred to the territorial profit and loss accounts but should be grouped and isolated as forms of inefficiency or efficiency in the profit and loss statements. Variances considered to be due to seasonal conditions should be treated as deferred items. Variances considered to be the result of using improperly prepared standards should be transferred to the territorial profit and loss accounts.

Standards for Salesmen. The general plan of setting selling cost standards for salesmen within each territory is similar to the one used in determining standards for territories; the difference is entirely in the amount of detail included in the analysis of costs. The preparation of standard selling costs for salesmen is considered a subclassification of the standard selling costs for the territory in question. In order to set standards for selling costs for each salesman, it is necessary to analyze selling costs over which he has control, such as his salary, commissions, special advertising, travel, telephone and telegraph, and supplies; all such items are considered in their relation to the sales quota assigned to him. The analysis may involve scheduling customer or dealer calls and planning the salesman's route each working day of the period. A standard budget can be prepared for the salesman to include these direct charges, but there must be added an amount to represent indirect territorial costs such as office rent, salaries of territorial executives, freight-out, advertising and general office costs. The standard budget will usually show these indirect items allotted to a particular salesman on the basis of his sales quota as a proportionate amount of the sales quota for the territory. The standard selling cost budget and the sales quota for each salesman can be used in deriving a standard selling cost rate for the salesman by means of the following formula:

$$\frac{\text{Standard selling cost budget—Jones}}{\text{Sales quota—Jones}} = \left\{\begin{matrix}\text{standard selling cost}\\ \text{rate for Jones}\end{matrix}\right\}$$

Each month a comparative profit and loss analysis statement, showing the profit or loss on each salesman's activities, can be prepared. The statement would show the standard manufacturing cost, standard selling cost, and standard administrative cost applicable to the salesman's sales for the period; the total would be deducted from the salesman's net sales to obtain the net profit or loss from his sales activities.

Generally such an analysis of profit and loss would be shown in subsidiary record form. The information can be shown adequately in analysis sheets; it would involve the use of too many accounts if such detailed cost data were shown in the general ledger.

Standards for Products, Sales Orders, and Customers' Accounts. It is possible to push the standard cost analysis for selling costs beyond the analysis of territories and salesmen to products, sales orders, and even to customers' accounts. The general plan follows that presented for determination of standard selling costs for salesmen, except that the unit of cost determination is the product, sales order, or customer's account. The process involves the extension of the cost analysis through the distribution of selling costs shown in the standard selling cost budget for the territory to the product, sales order, or customer's account and the computation of the profit or loss on the sales unit selected. Many accountants contend that it is impractical and of doubtful value to extend the cost analysis to such minute cost units, because the allocation of costs involves an increasing number of arbitrary distribution bases, and the results become increasingly unreliable and inaccurate.

CHAPTER XXI

CONTROL AND ACCOUNTING FOR ADMINISTRATIVE COSTS

CONTROL OF ADMINISTRATIVE COSTS

Difficulties arise in devising plans for the adequate control of administrative costs. These costs bear less relation to the main activities of production and sales but are more dependent upon the judgment and decisions of management than is any other group of costs. Directors' fees, executive salaries, and general operating policies, creating administrative costs, are generally determined by the board of directors. The size and scope of activities of each service division, such as public relations, general accounting, legal, statistics, and insurance, and the formulation of policies regarding depreciation, travel, rent, salaries of staff, entertainment, donations, memberships, and subscriptions are the responsibility of top management. Insurance rates and Federal, state, and local taxes are to a limited extent within the control of internal management, inasmuch as executives can determine insurance coverage and the extent of the assets and services subject to taxation.

Some control of costs and the activities creating such administrative costs can be obtained by the following:

a. Classification by type of cost and service functions and recording of activities and accomplishments of each service division.
b. Use of budgets and budget allowances for each class of cost and service division.
c. Development of unit standards and standard costs.

Control of Administrative Costs by Classification and Recording of Accomplishments. If it is assumed that it is a purpose of the management of a concern to obtain the most effective use of each dollar of cost and maximize profits, carefully prepared reports of the classification of administrative costs by object of expenditure and service division will make available to executives the amount spent for each purpose and enable them to compare costs by divisions and periods of time. The fact that the nature and amount of each item of cost is made available to several executives may result in some control because of the publicity, especially if some of the activities creating the costs are under the direct supervision of the executives themselves.

If a complete record of the accomplishments of each division, such as public relations, statistics, and income tax, is maintained and included in the reports of administrative costs to management, it is possible for an evaluation of the service to be made in terms of costs, so that policies can be formulated as to the enlargement, curtailment, or maintenance at its present size of each administrative division. For example, if the cost of supporting a legal department is known and the extent of the legal department's activities is available, the decision can be made as to whether it is more economical to continue to maintain a separate legal department or to employ an outside firm of attorneys on a part-time consulting basis. The same type of analysis could be made for income tax services and public relations.

Control of Administrative Costs through the Use of Budgeting. Since the existence of administrative costs is largely the result of the execution of executive activities and policies, it is the duty and responsibility of top management to decide the amount that can be effectively spent for each purpose by each division. The allotment of the proper amount for each purpose can be compared to the program of authorizing appropriations for advertising, divided among newspaper, radio, television, and direct mail, in the selling division of a business. It is difficult to determine the proper amount that should be spent for travel, publications, entertainment, and salaries for departments such as the public relations, but the board of directors and top management has such decisions to make.

The allotments for each purpose and division should be made in advance and incorporated in carefully prepared budgets, so that definite limitations and responsibilities will be determined for each departmental or divisional executive. The budget appropriations should be detailed by object of expenditure and period of time. Each month a comparison of budgeted and actual costs should be made available to management, and variances should be carefully analyzed by the budget committee and top management. The effectiveness of the control will depend upon the company's success in making the system of budgeting function through the enforcement of budget limitations. The technique and general procedure of budgeting is described in Chap. VIII.

Control of Administrative Costs through the Use of Standards. The nature of administrative activities precludes the preparation of administrative cost standards to the same extent and with the same degree of precision that can be applied to the manufacturing and selling divisions. However, there are some types of work, such as clerical, typing, posting, filing, and billing, in the administrative departments for which standard units of measurement and standard costs can be established. In spite of the fact that these activities may represent a small total cost as compared with expenditures for other segments of the administrative divisions, it is in line with an effective policy of good management to introduce controls in the form of standards wherever and whenever such forms of evaluation of efficiency and productivity can be used. An explanation of how standards for administrative costs can be determined and used as accounting data is given later in this chapter.

ACCOUNTING FOR ADMINISTRATIVE COSTS

Accounting Policies in the Treatment of Administrative Costs. It has been previously explained that, regardless of the accounting method employed, administrative costs should be classified by type or objective of expenditure, such as executive salaries, clerical salaries, travel, supplies, entertainment, donations, telephone, and telegraph. It is recommended that a control account, termed Administrative Cost Control, be used to summarize all costs, and that a subsidiary ledger in the form of separate ledger accounts or cards be maintained to classify the separate administrative costs. A secondary ledger or group of analysis sheets or cards may be used to classify the administrative costs by functions or service departments, such as Executive Office, Legal Department, General Accounting, Public Relations, and Statistical Department.

The problem remains as to the proper relationship of administrative costs to the other two main divisions of manufacturing and selling and the consideration that should be given to administrative costs in determining the total costs of jobs or products sold. There are three schools of thought, each requiring a different accounting program, as to the proper treatment of administrative costs, *viz.:*

a. The first follows the view that the two primary functions of operating a business enterprise are manufacturing and selling and that administrative costs are incurred for the benefit of these two functions. In line with this policy, administrative costs should be applied in part to one and in part to the other of the two main functions.

b. The second point of view recognizes the fact that the administration of a business performs functions that are independent of those of the other divisions of manufacturing and selling but equally important. Since administrative costs are concerned with policy formulation, finance, taxes, public relations, and other matters remotely connected with the actual manufacturing and sales activities, with no direct relationship to jobs or products manufactured and sold, and since such costs are largely fixed in nature and not dependent upon seasonal factors, they should be treated as period costs by transfer directly to Profit and Loss.

c. The third point of view follows the second one given above in recognizing the administrative division as performing separate functions, but recommends that administrative costs be added as a separate charge to the cost to make and sell the job or products.

Administrative Costs Applied to Manufacturing and Selling. If it is the policy of a concern to allocate administrative costs partly to the manufacturing and partly to the selling division in the determination of costs and profits, a number of problems are encountered in designing an accounting program and in the selection of equitable allocation bases.

The accounting procedure is not a difficult one. At the close of each accounting period, the Administrative Cost Control account would be credited and debits made to Factory Overhead Control, representing the amount of administrative costs applied to manufacturing operations, and to Selling Cost Control, representing costs assigned to selling activities. Subsequently, the administrative costs allocated to Factory Overhead Control would be distributed to service and production departments or processes and, through the use of predetermined factory overhead rates, would become an element of cost in determining job costs in the job order plant and product costs in the process-type plant. The administrative costs allocated to the Selling Cost Control account would be apportioned among the sales service departments and sales territories (or salesmen or lines of products) and would be included in the total cost of selling used in determining the profitableness of territories (or salesmen or lines of products).

The most difficult problems are (*a*) selecting equitable bases to apportion administrative costs between manufacturing and selling; and (*b*) apportioning the administrative costs assigned to Factory Overhead Control among the service and production departments or processes and apportioning the amounts assigned to Selling Cost Control among the sales service departments and territories. In making the distributions, each administrative cost should be analyzed to determine the service rendered, but many of the functions performed, such as those of the executive office and public relations, are so abstract and of such a joint nature that it may be necessary to resort to a general basis, exemplified by "number of employees in each division." However, it is possible to survey the work done in each administrative division for the other two divisions and to select bases that are acceptable.

If the policy of allocating administrative costs to manufacturing and selling functions is accepted, it should be pointed out that, in accordance with the accounting methods used by the majority of concerns, the share of the administrative costs assigned to manufacturing would be treated as a product cost and would become a portion of the inventory value, first as work in process and subsequently as finished goods until the completed production is sold; but the portion of the administrative costs assigned to the selling division would be treated as a period cost and would be included in the selling costs transferred to Profit and Loss for the period.

Administrative Costs Transferred to Profit and Loss as Period Costs. There appears to be an increasing number of executives who favor the treatment of administrative costs as a direct charge to Profit and Loss in the accounting period in which the costs are incurred. They reason that no satisfactory or equitable bases of distribution can be selected to apply administrative costs to the manufacturing and selling divisions and to jobs or products. In addition, they consider administrative costs to be "fixed" costs, not dependent upon seasonal fluctuations in production and sales, and, therefore, treated correctly as period costs. The accounting treatment is a simple one. At the end of the accounting period, as a step in closing the books, an entry is made debiting Profit and Loss and crediting the Administrative Cost Control account.

A criticism of this method of treating administrative costs is that the total cost of jobs, products, territories, and activities of salesmen does not include the very important costs representing administration, and, therefore, the net profit or loss for each operating segment of the business will not be computed and reported.

Administrative Costs Applied to Jobs or Products as a Separate Charge. This accounting policy provides for administrative costs being shown separately and added to the cost of manufacturing and selling in presenting the total cost to make and sell each job or group of products. It provides for the costing of jobs or products sold in the accounting period in which the sales are recognized. The accounting procedure for the application of administrative costs directly to the job or products as a separate cost is easily used and offers few practical difficulties. The administrative division is treated as a separate functioning division, comparable with the sales and manufacturing divisions of the organization, and, as soon as sales are made, a cost of sales analysis sheet may be prepared to show the manufacturing cost, the selling cost, and the administrative cost applied to a particular sales order.

In preparing a distribution plan for administrative costs, the most important problem is to select an equitable base for the allocation of this cost to the cost of the product. The accounting records prepared by the sales and production divisions provide data that can be used, such as:

a. Sales (in dollars).
b. Number of units to be sold.
c. Selling cost.
d. Manufacturing cost.
e. Number of units to be manufactured.
f. Gross profit on sales.

It is obvious after surveying this list of suggested bases that no single base measures the direct connection between the product and the administrative departments, nor does it measure the value of the service received. The first three bases emphasize the selling function, whereas the fourth and fifth emphasize the manufacturing function. Since operating conditions vary widely among concerns, the most practical solution in any particular case is to select the method of distribution that seems best fitted to the particular conditions. Generally the sales, the gross profit on sales, the number of units sold, or some combination of the bases suggested above would provide an equitable distribution of administrative cost to the product. The application rate is computed by dividing the administrative cost by some base such as net sales or the number of units to be sold. One formula may be suggested that employs sales as a basis of distribution:

$$\frac{\text{Administrative cost for period}}{\text{Net sales for period}} = \text{administrative cost application rate}$$

A plan that parallels the accounting system suggested for the sales and manufacturing divisions is presented. A controlling account termed Administrative Cost Control is used to *summarize the costs at the end of* each month. Standing orders, one for each type of cost, are maintained subsidiary to the Administrative Cost Control account. Each standing order is provided with a column for each month and shows the amount of the cost assigned to each administrative department; amounts can be reclassified by departments in another group of standing orders, if the management desires information relative to the costs of maintaining each of the administrative departments.

If the administrative cost is to be applied to the product, the rate is used to apply a share of this cost to the cost of goods sold. In the general ledger the controlling account termed Administrative Cost Control is credited, and the General Profit and Loss account or the profit and loss account for each territory is debited. Entries to these accounts are summary entries; the detailed recording is to the analysis sheet of profit and loss on sales orders.

An example will aid in clarifying the procedure. It is assumed that the record of administrative costs for the year shows a total cost of $100,000 and that the net sales total $1,000,000 of manufactured products for the period. If the sales basis of allocating administrative cost is used, the rate for the year is 10 per cent of sales. If on Jan. 10 an order for 100 units is shipped to the California territory at a total sales price of $1,500, the amount of administrative cost applied to the order is $150. In subsidiary records the amount applied may be inserted in an analysis sheet of profit and loss on sales orders for the California territory, in which will be shown the total cost of the order, including manufacturing cost, applied selling cost, applied administrative cost, the sales price, and the profit or loss. The general ledger entry consists of a debit of $150, the amount of the applied administrative cost, to the Profit and Loss account for the California territory; or, if territorial profit and loss accounts are not used, a debit is made to the General Profit and Loss account and a credit to the Administrative Cost Control account for the same amount.

STANDARDS FOR ADMINISTRATIVE COSTS

With the growth of the business unit, administrative departments have become increasingly important in the efficient operation of business enterprises. It is a current idea that, if there is an increase in the volume of business, there will not be a corresponding increase in administrative costs; that such costs are fixed overhead items; and that extra business can be added without extra cost. Various studies of costs disprove the validity of this contention. Actually, a substantial increase in the volume of business generally results in an increase in clerical personnel, and there is no corresponding decrease in personnel when business volume declines. During peak periods office work is reapportioned among employees, and the added personnel become links in the chain of office routine. The handling of each new order and account requires additional individuals, with the result that, as the volume of business increases, the office procedures and the forms of internal check required become more complex and the people involved in each transaction increase in number. Since there is a tendency for the cost of administration to increase almost in proportion to the volume of business, it is necessary to exercise means of managerial control by the standardization of activities, through budgeting, and by means of standard costs.

Every phase of administrative activity can be subjected to budgetary control, which in itself encourages more economical operation. In addition, many administrative operations can be standarized through the application of a standard unit of measurement. Standardization is a means of bringing together similar operations, of methodizing them, and of setting up standards for measuring the accomplishment of each person or of each group of persons. Standardization results in the specialization of operations, so that the routing of work from employee to employee is systematic; each person becomes a specialist, and the work is accomplished with maximum efficiency at a minimum cost. Standardization of work may be followed by the computation of standard costs for particular operations, so that the time and cost that should be required to perform an operation or service are established before the work is begun.

Procedure in Determining Unit Standards and Standard Costs. The steps in the establishment of standards for administrative functions are as follows:

a. Classification of tasks that can be standardized.
b. Selection of an equitable unit of measurement of work performed.
c. Time and motion study of each operation or task.
d. Selection of an incentive plan to compensate employees for surpassing standard performance.
e. Determination of a standard cost for each operation or task.
f. Adoption of plans for reporting work done by each employee.
g. Incorporation of standard costs in budgetary plans for each function or department.

All administrative functions cannot be standardized. For example, it is impossible to make time and motion studies of the activities of major executives, and it is impractical to attempt to standardize the work of lawyers, accountants, or statisticians. The efficiency and success of the work of executives and of technical advisers are strictly a matter of managerial opinion, and their compensation is generally a managerial decision. The standardization of tasks and the determination of unit cost standards are largely limited to office activities in which there is a division of labor and specialization of work. The following list of administrative functions and standard units of measurements is suggestive rather than exhaustive:

Function or Department	Standard Units of Measurement
Personnel	Cost per employee, cost per person employed, discharged, and reclassified
Accounts receivable	Cost per customer's account; cost per posting
Bookkeeping	Cost per posting; cost per transaction

Billing	Cost per account; cost per statement rendered
Dictation	Cost per letter dictated
Transcribing	Cost per letter transcribed
Welfare	Cost per employee
Mailing	Cost per piece of mail handled
Credit	Cost per credit application investigated or account reinvestigated
Collection	Cost per account; cost per collection; cost per dollar of collection
Filing	Cost per item handled
Traffic	Cost per shipment
Travel	Cost per mile; cost per diem

It is possible to keep a record of the units of service involved in the activities of each department and to divide the total cost of the department by the number of units to obtain the average cost per unit. For example, the average cost per employee handled by the personnel department can be determined; the average cost per statement prepared by the billing department can be computed; the average cost per hundred postings may be secured for the bookkeeping department; the average cost per letter written can be determined for the correspondence division; and the average cost per employee can be secured for the welfare service. Thus management may set up an index of cost per activity that can be used in comparing the efficiency of one period's operation with that of another and in planning for the expansion and contraction of personnel.

In many concerns another step in the standardization of costs is taken in the form of time and motion studies that are made for the purpose of determining what the cost per activity *should* be. Thus a study may be made of the time required to post an accounting transaction, to dictate and transcribe a typical letter, to handle 100 pieces of mail, or to prepare a customer's statement. A standard time can be established for each unit, and the time multiplied by the employees' wage rate constitutes the standard cost. In some enterprises piece-rates are established to compensate certain workers, such as posting machine operators and mail clerks, for the actual work accomplished. In other concerns a record of each employee's accomplishments is maintained, and the worker is rewarded or reprimanded for work above or below standard. The use of standard unit costs is also valuable to management in preparing budget plans for the ensuing period.

Standard Administrative Cost Budgets. A standard administrative cost budget should be prepared for the budget period, preferably for a year, to show the standard cost of each administrative function. A separate budget may be prepared for each administrative department, or a single budget may exhibit in detail the standard costs for each item of cost for each function performed.

The standard administrative cost budget should show a classification of fixed and variable costs. The fixed costs include such items as depreciation of equipment, taxes, rent, administrative salaries, insurance, and heat. For items in this group, the actual cost conditions expected to exist during the budget period may be considered the standard, and the amount estimated for each fixed administrative cost item is deemed to be the standard cost. The standard cost for variable items, including travel, supplies, bonuses, telephone and telegraph and clerical salaries, is determined by estimating the number of units of service expected of each department and by multiplying the total by the standard cost per item. This method may be used advantageously for all services for which a standard unit of measurement can be established. If units of measurement cannot be determined, it is necessary to make a careful investigation of the requirements of each department and to determine an arbitrary cost. Supplies and telephone and telegraph are typical of costs that must be arbitrarily estimated after consideration has been given to all the factors involved.

Standard Administrative Cost Application Rates. It was explained in this chapter that an amount of administrative cost may be charged against sales of each accounting period so that the total cost to manufacture and sell and the profit or loss could be determined for each territory and sales order. In a similar manner, when standard administrative costs are computed, a standard amount of administrative cost should be charged to each dollar of sales. This may be accomplished by computing a standard administrative cost rate at the beginning of each period by means of the following formula:

$$\frac{\text{Standard administrative cost for budget period}}{\text{Standard sales quota for budget period}} = \text{standard administrative cost rate per dollar of sales}$$

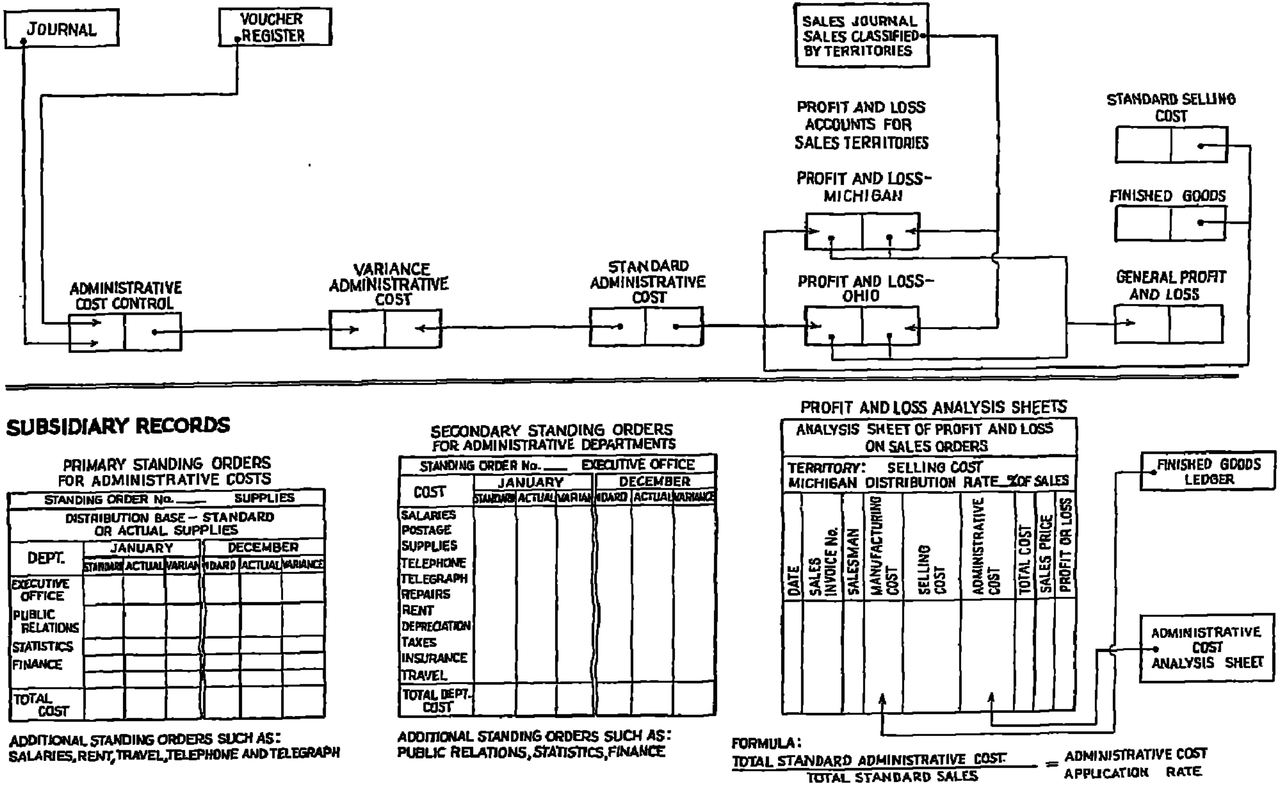
For example, if the standard administrative cost for a year is $100,000 and the sales quota for the period is $1,000,000, the standard administrative cost chargeable to each dollar of sales is 10 per cent of sales.

Allocation of Standard Administrative Costs to Lines of Products or Territories. It may be practical in some enterprises to relate the activities of the administrative departments to sales divisions in the form of territories or to various lines of products. This additional step in the preparation of standard administrative and selling cost budgets will require the selection of bases for the allocation of administrative costs to the territories or lines of products.

Accounting Procedure for Standard Administrative Costs. The accounting procedure illustrated in Exhibit 123 may be employed in accounting for standard administrative costs. The accounting procedure during the accounting period is to debit the profit and loss account for each territory and to credit the Standard Administrative Cost account for the amount of standard administrative cost charged to the territory, based upon the standard administrative cost rate per dollar of sales or other selected bases of allocation. The actual administrative costs are

EXHIBIT 123

A SYSTEM OF ACCOUNTING FOR STANDARD AND ACTUAL ADMINISTRATIVE COSTS


JOURNAL
VOUCHER REGISTER
SALES JOURNAL SALES CLASSIFIED BY TERRITORIES
PROFIT AND LOSS ACCOUNTS FOR SALES TERRITORIES
PROFIT AND LOSS-MICHIGAN
PROFIT AND LOSS-OHIO
STANDARD SELLING COST
FINISHED GOODS
GENERAL PROFIT AND LOSS
ADMINISTRATIVE COST CONTROL
VARIANCE ADMINISTRATIVE COST
STANDARD ADMINISTRATIVE COST
SUBSIDIARY RECORDS
PRIMARY STANDING ORDERS FOR ADMINISTRATIVE COSTS
STANDING ORDER No.____ SUPPLIES
DISTRIBUTION BASE – STANDARD OR ACTUAL SUPPLIES
DEPT.
JANUARY
DECEMBER
STANDARD
ACTUAL
VARIANCE
EXECUTIVE OFFICE
PUBLIC RELATIONS
STATISTICS
FINANCE
TOTAL COST
ADDITIONAL STANDING ORDERS SUCH AS: SALARIES, RENT, TRAVEL, TELEPHONE AND TELEGRAPH
SECONDARY STANDING ORDERS FOR ADMINISTRATIVE DEPARTMENTS
STANDING ORDER No.____ EXECUTIVE OFFICE
COST
SALARIES
POSTAGE
SUPPLIES
TELEPHONE
TELEGRAPH
REPAIRS
RENT
DEPRECIATION
TAXES
INSURANCE
TRAVEL
TOTAL DEPT. COST
ADDITIONAL STANDING ORDERS SUCH AS: PUBLIC RELATIONS, STATISTICS, FINANCE
PROFIT AND LOSS ANALYSIS SHEETS
ANALYSIS SHEET OF PROFIT AND LOSS ON SALES ORDERS
TERRITORY: MICHIGAN
SELLING COST DISTRIBUTION RATE ____% OF SALES
DATE
SALES INVOICE No.
SALESMAN
MANUFACTURING COST
SELLING COST
ADMINISTRATIVE COST
TOTAL COST
SALES PRICE
PROFIT OR LOSS
FINISHED GOODS LEDGER
ADMINISTRATIVE COST ANALYSIS SHEET

FORMULA:

$$\frac{\text{TOTAL STANDARD ADMINISTRATIVE COST}}{\text{TOTAL STANDARD SALES}} = \text{ADMINISTRATIVE COST APPLICATION RATE}$$

CHAPTER XXII

COST ANALYSIS FOR MANAGEMENT DECISIONS

In the preceding chapters an attempt has been made to explain important cost accounting principles and procedures. It has been emphasized that cost accounting is a tool of management that can be used in the day-to-day control and supervision of manufacturing, distribution, and administrative activities. However, many problems come to the attention of management that require for proper handling cost data that cannot be supplied by even the most complete and well-operated regular cost accounting systems.

At the majority of meetings of the board of directors or management group, there are presented for consideration and action one or more problems of policy that require a knowledge of expected income and costs which would result if the proposed course of action is approved and included in the concern's production or distribution plans. These include literally hundreds of decisions that may have to be made by management, ranging from the proposed replacement of a small machine in a factory department to the complete modernization of the factory, the building of an additional plant, or the addition to the sales line of a new product. The decisions before the management group may involve only the expenditure of a few hundred dollars or they may represent investment of millions of dollars in projects, with the company's future being dependent upon the financial success of the expansion. In an effort to maximize profits, managerial decisions should be made after all conditions of expected income and costs have been carefully explored and analyzed. It is the duty of the cost accountant to translate the proposed plans into budgets of expected revenue and costs and to prepare analyses of the data so that the financial results can be anticipated before final action is taken by management.

MANAGERIAL PROBLEMS REQUIRING COST ANALYSIS

Establishing General Business Policies. An analysis of expected future costs is essential in determining business policies. Although past costs are important as a basis for comparing past operations with present conditions, they have no necessary relationship to projected costs. Thus, as a problem of management, projected costs are used primarily in guiding decisions yet to be made.

They are of assistance in establishing policies consistent with legislation. They help both corporations and price regulatory bodies or contract settlement agencies in arriving at agreements according to law.

The expansion of the volume of production during the war period had an important bearing upon pricing policies of producers with war contracts. The necessity for renegotiation of war contracts has arisen because original cost estimates were based upon one volume while actual manufacturing was done on a much higher level of production.

Specifically, legislation such as the Robinson-Patman Act creates the problem of the relationship between price and cost differentials. The act prohibits differences in selling prices that are greater than differences in cost. Lower selling prices or higher discounts are permissible only if such action is based upon a savings resulting from an increased volume of production and distribution. Studies of differences in costs are used to prove the savings.

An analysis of the additional costs and losses in revenue due to a prolonged strike, as compared with the additional labor costs or benefits if the union terms are accepted, may be a deciding factor in a concern's collective bargaining policy.

Determining Price Policies. Consideration of cost and revenue in business planning involves the careful pricing of an industrial product. The element of revenue requires that someone with market information and experience should estimate the quantities that can be sold at a variety of possible prices. Someone with cost and budgetary training should estimate the cost required for each of the possible quantities and the profit at each price level. Finally, someone must compare the sales revenue, costs, resulting accounting profit, and required working capital for each level of volume and establish a price most likely to yield the most profit for a projected period. In case of a recession it may not be a matter of determining the maximum profit, but rather of deciding what amount of plant activity will incur the smallest loss.

A cost system that discloses differences in costs makes it easier to obtain the information necessary for the management to determine a pricing policy. The selling price of any product or order should cover at least the cost, which would be incurred if it were produced, plus a return to management. Data may be secured as to how cheaply goods can be sold; how much a concern can afford to cut prices in order to hold its business; and what price can be quoted for a competitive bid. It is likely that selling prices will be set on a sliding scale for large and small buyers and for differences in services. The cost per order, for example, is usually higher for larger orders, because salesmen may spend more time with the larger buyer, and because it takes longer to handle and ship the larger order. The cost per order may be higher for larger orders, but the cost per unit may be smaller. Thus, a company may find that it is more economical to sell to wholesalers than to small distributors.

In other instances, a lower price can be quoted for goods f.o.b. the plant than for goods that are delivered. Differentials can be allowed on unsolicited orders sent in by mail, as compared with sales made through a salesman's call at the customer's place of business. Cash business can be distinguished from credit sales. Recognition can be given to pooled orders, off-peak business, and other cost-saving features.

Determining Volume Policies. The determination of business volume and that of selling prices are so interrelated that it is often difficult to distinguish factors affecting them. The selling price that can be secured may determine the level of production; on the other hand, plant capacity and volume may control the price at which the commodity is offered for sale. Studies of differences in costs are helpful in analyzing and showing what the effect of a firm's activity will have on production costs and selling price. A rise in the level of production usually lowers unit costs; a decrease in volume usually increases unit costs. A rise in the selling price may increase or decrease profits. Cost studies are necessary when it comes to deciding whether to maintain existing output, increase or decrease it, or shut down altogether. A firm becomes no poorer in accepting business that covers all the additional costs of production, including a return to management. A concern is richer for taking the business if it covers more than the variable costs, but poorer if it fails to cover the additional costs. Reasonably accurate forecasting is important to avoid overproduction and to undertake increased production where it is economical.

Cost analysis is also useful to a business firm in ascertaining whether it is a low-cost or high-cost producer. Such knowledge assists not only in determining the point at which increased production becomes unprofitable, but also in establishing the position of the company in relation to the other members of the industry. The board of directors may thus be aware of the limitations of the business in considering such matters as sacrificing volume for price, taking business at a "special price," risking decline in price of other sales, computing costs of unusual orders, figuring the effect of a two-shift operation, and setting prices when there is no established price structure. Finally, the problem of determining the volume of production involves consideration of whether to produce seasonally in slack periods for peak periods. The points to be taken into account consist of weighing the advantages of a stabilized production program against such additional costs as storage and protection of inventories.

Replacement and Retooling of Machinery. Special situations within a plant may require the use of cost analyses. The cost of replacing an old machine should be compared with the lowered costs of production on a new machine in terms of the number of units that it will produce. A machine may be in use for regular production. An order may come in that must be filled immediately or the customer will be lost. Another machine may be retooled to do the work, but production costs are increased by the retooling. A study of costs in relation to the size of the order should indicate whether or not it is worth while to retool the machine, complete the order, and satisfy the customer.

Similar problems arise in connection with repairing equipment, installing or moving machinery and equipment, remodeling plant facilities, and building plant additions. The cost of employing outside firms can be compared with the cost of using the concern's own equipment and workmen.

To Make or Buy. The management of manufacturing concerns is frequently confronted with the alternative of whether it is more profitable to purchase parts from suppliers or to produce the parts in the concern's own plant. Questions arise as to whether the parts can be processed and stocked during periods of low production with idle equipment and workers, or whether new plant, equipment, and specially trained labor will be required.

The cost of production can be compared with the price paid to suppliers. It is a question for management to decide whether the cost of producing the parts in the concern's plant should include only the *direct* costs or whether a share of the fixed costs of the entire enterprise should be included.

Determining Sales Policies. The analysis of costs plays an important part in governing sales policies. The management of firms involved in marketing activities is concerned frequently with the profitableness of adding a new product to its line, expanding sales activities into new territories, promoting sales to obtain new customers, or selling through a new sales channel.

The substitution of a smaller number of highly trained specialty salesmen, receiving higher salaries and commissions, for a larger number of less experienced salesmen warrents a careful study of comparative income and costs. The advisability of adding an additional salesman, of mailing catalogues to small customers, or of limiting the number of customers' accounts should be determined by means of an analysis of additional income and costs expected from the execution of the new policies.

The comparative cost of maintaining a delivery service and the cost of employing a merchants' delivery service may be the determining factor in deciding how a department store will handle its delivery of merchandise sold.

During periods of recession, the managerial problems may include the analysis of comparative costs and income and the net loss that might result from dropping a product, discontinuing a product or service, reducing the number of salesmen, or "dumping" products in foreign markets.

FACTORS TO BE RECOGNIZED IN COST ANALYSES

Economics of Supply and Demand. Economics considers variations of supply and demand. The concept of demand refers to a schedule of the amounts that buyers are willing to purchase of a commodity at different prices during any period of time, other things being equal. Supply is usually spoken of as a schedule of the amounts of a commodity that are offered for sale at different prices during any period of time, other things being equal. The time element takes into consideration "short-run" and "long-run" periods. In the latter period all costs of the producer become variable. In the short run, however, some costs are variable while others are fixed because producers use only those means of production already in a given combination. There is nothing in a cost itself that makes it variable or fixed; it is the period of time in relation to use of the factors that gives rise to the distinction. This chapter is limited to the planning for the established firm in the short-run period.

Problems of Estimating. There are many factors to be taken into account in making future estimates for a concern. The effects upon demand of shifts in population, of savings available for consumer spending, of tax policies, of deficit financing, and of governmental spending must be examined. Losses arising from market exploitation incident to disposing of increased output must be recognized. "Spoiling the market" for future sales is a disadvantage of price cutting. Spoiling the market may possibly be avoided by selling through a new outlet which may be found in a foreign area or in a new territory in the domestic market. Increments of output may be camouflaged so that they do not appear to be in direct competition with goods previously marketed. Such an accomplishment may result from the use of new trade names. Additional demand may be created by advertising.

Factors affecting costs include availability of material; hours, wages, and working conditions; and plant capacity. Capacity is determined by a study of past performance, future plans, rate of growth, and consideration of potential markets. The capacity of a plant is expressed in terms of units, machine-hours, direct labor-hours, or direct labor cost. A plant, sooner or later, reaches a level of output beyond which fixed costs begin to rise rather sharply in the short run. To avoid pushing output into this range of operations, it may be that the economics to be attained by facilities of a large scale may prove that it will be more economical to use an oversize plant intentionally at less than capacity than a small plant at full capacity. Indications may be that costs will rise so sharply that it would be economical in order to obtain flexibility to overbuild the plant to take care of peak loads that may arise.

Another phase of cost is the advisability of increasing or reducing output. Raising the volume of production may develop maximum revenues and minimum unit costs; yet union regulations, repair programs, and age or specialization of machines may deter management from changing the rate of activity. Workers and machines are not uniformly efficient. If the directors of a business are employing the minimum cost combination of labor and machines and use higher cost combinations only at high levels of output, the result will be costs that show an increasing rate as production is increased. In the reduction of output not only the costs saved must be considered, but also certain costs arising out of reduction itself; as, the cost of hiring, equipping, and training personnel at the conclusion of the temporary decline in business.

Operating Factors. Operating factors to be recognized in the development of cost analyses involve an examination of all costs in order to see the effect of changes in the rate of activity upon them. Material unit cost may be lowered by a saving in additional trade and cash discounts resulting from large-quantity purchasing. A decline in production will tend to raise material unit costs. Unit labor cost may be lowered with increased production if some wage incentive plans are used. The inefficiency of new workmen will decrease output. The cost per unit of overhead will be lowered or raised with increased production, depending upon the relative amounts of fixed, semifixed, and variable costs. Factors tending to decrease average overhead cost are illustrated by a constant amount of indirect labor cost, depreciation, property taxes, and insurance, which remain more or less fixed at all levels of production. An increase in the number of indirect laborers, accelerated depreciation and repairs arising from additional use of equipment, and an increase in spoilage are variable items that serve to increase overhead costs.

Distribution and administrative costs should be examined to see the effect of increased production. Distribution costs may be divided into two parts: order getting and order filling. Travel, commissions, and sales promotional activities are included in the cost of securing an order. Order filling includes such costs as order and invoice handling, warehousing, shipping, and transportation-out. The influence of varying levels of production upon the marketing and administrative costs depends upon the relative fixity of their component costs.

Segmentation of Costs. The usefulness of cost analysis depends upon the reliability and the degree of accuracy used in segmenting costs into fixed, semifixed, and variable costs. Fixed costs do not vary with increases or decreases in productive activity. Semifixed costs vary to some extent with changes in production. Variable costs increase and decrease with the rise and fall in the rates of activity. Though some variable costs vary in proportion to changes in the volume of output, others are not proportional but show only related fluctuations.

The foregoing classifications are not perfect because few costs remain fixed under all conditions of plant operation. If segmentation of costs were perfect, there would be no semifixed items; for if this class of cost could be sufficiently broken down, it could be divided into fixed and variable elements. Such an analysis is often impractical. For example, a company may be able to use a fixed number of factory supervisors over a range of productive levels. If output is extended beyond a certain point, a second shift is required, and the previous fixed cost of supervision immediately rises because of the necessity of night supervisors who will continue to be required regardless of the range in output of the second shift. The policy may also be established to hire an additional typist for the sales department and to employ another accountant when the firm is operating at 90 per cent of capacity, as contrasted with 80 per cent of capacity. Though conditions such as the ones described have created the semifixed category of costs, it is important that costs be segmented as finely as possible because this assists management in controlling costs of manufacturing and distribution.

There are various methods of segmenting costs. Variation in the number of shifts, the length of the working shift, the number of days of operation, the alteration of the speed of machines, and job analysis are bases of segmentation. Establishing departments and machine centers in a firm assists in segmenting the operations. The acceleration of production volume causes some costs to be increased and others to be lowered, and it is the combining of the favorable and the unfavorable factors of production that determines differences in costs at a particular level.

Recording of Projected Costs. From their very nature, projected costs are not available for routine compilation in the same manner that cost accounting systems collect average costs. Statistical analysis and flexible budgetary procedures are appropriate methods. After plans for future operations have been formulated, several complete cost estimates can be prepared indicating what costs would be under each of the proposed budgetary plans.

The cost accountant, statistician, engineer, and a representative of management should cooperate in collecting data concerning costs at the anticipated levels of output. Each item of cost must be studied to see how it varies with plant size and the volume of production. Fixed assets must be surveyed and plans made for their use at various rates of activity. A study must be made of repairs and maintenance practices. Operating costs must be reviewed at the present level of production and at various projected volumes of output. Every item of indirect cost should be examined individually to see how it actually would be affected by each change under consideration. A detailed study must be made of all costs: material, labor, overhead, distribution, administration, and financing. It will be observed that the techniques followed are those used in preparing flexible budgets.

Preparation of Flexible Budgets. In order to explain the preparation of flexible budgets and procedures of making cost analyses for managerial decisions, an illustrated problem of a hypothetical company with a fixed investment in plant and equipment is used. It is assumed that, for purposes of planning future operations and as an aid in establishing a selling price, estimates of costs are desired for the hypothetical company at levels of activity ranging from 60 to 120 per cent of normal capacity. The first step is to prepare the anticipated costs for the desired levels of production. A satisfactory starting point is a chart of accounts, which gives a preliminary, orderly organization of costs. The costs should be classified into three main categories: fixed, semifixed, and variable. Within this

EXHIBIT
SCHEDULE OF

	(1) 60%	(2) 70%	(3) Differential cost (Col. 2 – Col. 1)	(4) 80%	(5) Differential cost (Col. 4 – Col. 2)
Fixed costs:					
Manufacturing costs:					
Executive salaries	$ 55,000	$ 55,000		$ 55,000	
Rent	90,000	90,000		90,000	
Depreciation of machinery	30,000	30,000		30,000	
Insurance	10,000	10,000		10,000	
Taxes	15,000	15,000		15,000	
Total manufacturing costs	$200,000	$200,000		$200,000	
Selling costs:					
Executive salaries	$ 65,000	$ 65,000		$ 65,000	
Office costs	55,000	55,000		55,000	
Total selling costs	$120,000	$120,000		$120,000	
Administrative costs:					
Executive salaries	$ 45,000	$ 45,000		$ 45,000	
Office costs	35,000	35,000		35,000	
Total administrative costs	$ 80,000	$ 80,000		$ 80,000	
Total fixed costs	$400,000	$400,000		$400,000	
Semifixed costs:					
Manufacturing costs:					
Supervisory salaries	$ 25,000	$ 25,000		$ 29,000	$ 4,000
Light and heat	5,000	5,000		6,000	1,000
Total manufacturing costs	$ 30,000	$ 30,000		$ 35,000	$ 5,000
Selling costs:					
Salesmen's salaries	$ 9,000	$ 9,000		$ 11,000	$ 2,000
Insurance and taxes	1,000	1,000		2,000	1,000
Total selling costs	$ 10,000	$ 10,000		$ 13,000	$ 3,000
Administrative costs:					
Clerical salaries	$ 4,000	$ 4,000		$ 5,000	$ 1,000
Insurance and taxes	1,000	1,000		2,000	1,000
Total administrative costs	$ 5,000	$ 5,000		$ 7,000	$ 2,000
Total semifixed costs	$ 45,000	$ 45,000		$ 55,000	$10,000
Variable costs:					
Manufacturing costs:					
Materials	$ 33,000	$ 35,000	$2,000	$ 40,000	$ 5,000
Labor	54,000	56,000	2,000	64,000	8,000
Repairs	2,000	3,000	1,000	7,000	4,000
Power	1,000	2,000	1,000	5,000	3,000
Total manufacturing costs	$ 90,000	$ 96,000	$6,000	$116,000	$20,000
Selling costs:					
Commissions	$ 14,000	$ 15,000	$1,000	$ 16,000	$ 1,000
Travel	4,000	5,000	1,000	6,000	1,000
Total selling costs	$ 18,000	$ 20,000	$2,000	$ 22,000	$ 2,000
Administrative costs:					
Office supplies	5,000	6,000	1,000	7,000	1,000
Total variable costs	$113,000	$122,000	$9,000	$145,000	$23,000
Total costs	$558,000	$567,000	$9,000	$600,000	$33,000
Number of units produced	600,000	700,000		800,000	
Average cost per unit	$ 0.93	$ 0.81	$ 0.09	$ 0.75	$ 0.33

124
PROJECTED COSTS

(6) 90 %	(7) Differential cost (Col. 6 − Col. 4)	(8) 100 %	(9) Differential cost (Col. 8 − Col. 6)	(10) 110 %	(11) Differential cost (Col. 10 − Col. 8)	(12) 120 %	(13) Differential cost (Col. 12 − Col. 10)
$ 55,000		$ 55,000		$ 55,000		$ 55,000	
90,000		90,000		90,000		90,000	
30,000		30,000		30,000		30,000	
10,000		10,000		10,000		10,000	
15,000		15,000		15,000		15,000	
$200,000		$200,000		$200,000		$200,000	
$ 65,000		$ 65,000		$ 65,000		$ 65,000	
55,000		55,000		55,000		55,000	
$120,000		$120,000		$120,000		$120,000	
$ 45,000		$ 45,000		$ 45,000		$ 45,000	
35,000		35,000		35,000		35,000	
$ 80,000		$ 80,000		$ 80,000		$ 80,000	
$400,000		$400,000		$400,000		$400,000	
$ 42,000	$13,000	$ 46,000	$ 4,000	$ 46,000		$ 46,000	
8,000	2,000	9,000	1,000	9,000		9,000	
$ 50,000	$15,000	$ 55,000	$ 5,000	$ 55,000		$ 55,000	
$ 12,000	$ 1,000	$ 14,000	$ 2,000	$ 14,000		$ 14,000	
3,000	1,000	4,000	1,000	4,000		4,000	
$ 15,000	$ 2,000	$ 18,000	$ 3,000	$ 18,000		$ 18,000	
$ 7,000	$ 2,000	$ 8,000	$ 1,000	$ 8,000		$ 8,000	
3,000	1,000	4,000	1,000	4,000		4,000	
$ 10,000	$ 3,000	$ 12,000	$ 2,000	$ 12,000		$ 12,000	
$ 75,000	$20,000	$ 85,000	$10,000	$ 85,000		$ 85,000	
$ 45,000	$ 5,000	$ 50,000	$ 5,000	$ 55,000	$ 5,000	$ 60,000	$ 5,000
72,000	8,000	80,000	8,000	90,000	10,000	100,000	10,000
21,000	14,000	40,000	19,000	79,000	39,000	109,000	30,000
12,000	7,000	27,000	15,000	58,000	31,000	120,000	62,000
$150,000	$34,000	$197,000	$47,000	$282,000	$85,000	$389,000	$107,000
$ 17,000	$ 1,000	$ 19,000	$ 2,000	$ 22,000	$ 3,000	$ 27,000	$ 5,000
7,000	1,000	9,000	2,000	12,000	3,000	17,000	5,000
$ 24,000	$ 2,000	$ 28,000	$ 4,000	$ 34,000	$ 6,000	$ 44,000	$ 10,000
8,000	1,000	10,000	2,000	13,000	3,000	18,000	5,000
$182,000	$37,000	$235,000	$53,000	$329,000	$94,000	$451,000	$122,000
$657,000	$57,000	$720,000	$63,000	$814,000	$94,000	$936,000	$122,000
900,000		1,000,000		1,100,000		1,200,000	
$ 0.73	$ 0.57	$ 0.72	$ 0.63	$ 0.74	$ 0.94	$ 0.78	$ 1.22

pattern costs may also be shown by manufacturing, selling, and administrative functions illustrated in the Schedule of Projected Costs, Exhibit 124. There may be a further breakdown by departments and products if it is so desired.

Each item of cost has to be studied to ascertain whether it is fixed, semifixed, or variable and to determine what it will be at the various levels of production. Although there are no differences in fixed costs in the short run, it is desirable to list all costs in order to determine the total costs for the different rates of activity. Numerous data sheets will be used in the analysis of cost, and Exhibit 124 is a recapitulation of the working papers supporting each cost item.

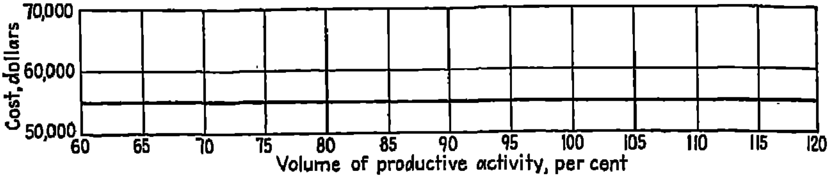


Exhibit 125. Executive salaries charged to manufacturing for various volumes of productive activity.

It is often desirable to summarize the records graphically. Exhibits 125 to 127 present graphic illustrations of a fixed, semifixed, and variable cost, respectively. Exhibit 125 shows the executive salaries listed under the manufacturing section of the Schedule of Projected Costs; Exhibit 126 represents the light and heat listed under manufacturing; and Exhibit 127 presents the cost of materials included in the manufacturing division. These exhibits are only sample illustrations. A separate graph may be prepared for every item of cost. If the exhibits are kept in a loose-leaf binder, any single cost that changes may be replaced without reworking the whole system. The graphs are valuable aids for purposes of interpolation and comparison. If a special situation arises within the business in which it is desired to determine what the costs would be at a particular level, such as 85 per cent, the job of obtaining the amounts from the graphs is simpler than the task of preparing a separate study. It is worth while, furthermore, to compare the projected costs with actual costs, for an examination of the deviations from actual will assist in future forecasting. If actual production was at 77

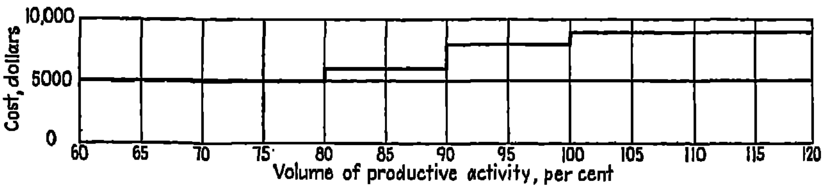


Exhibit 126. Light and heat cost for various volumes of productive activity.

per cent of capacity, the anticipated costs at this level should be compared with the actual costs. Exhibit 124 does not illustrate figures for the volume desired, but a separate schedule can readily be made at the 77 per cent level from the curves on the various charts for each cost item.

Exhibit 124 shows the fixed, semifixed, and variable costs at each of seven levels of production. Within the three categories, subclassifications have been made for manufacturing, selling, and administrative items. The effect of change upon different functions of the enterprise may thus be observed. Subtotals have been made for each function within each category of cost and for each classification of cost, and grand totals are shown.

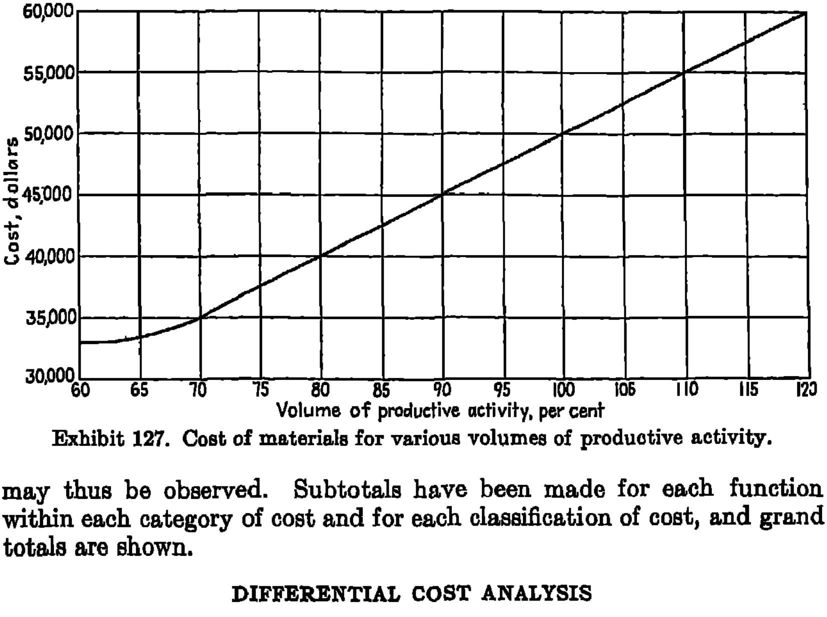


Exhibit 127. Cost of materials for various volumes of productive activity.

DIFFERENTIAL COST ANALYSIS

Definition of Differential Costs. Differential costs, also frequently described as *marginal costs* and *incremental costs*, are the increase or decrease in total costs that result from producing and distributing additional or fewer units of a product or from a change in method of production or distribution such as the use of improved machinery, addition of a product or territory, or selection of an additional sales channel. They are anticipated costs and refer to future operations. They are not entered in general accounting records, but may be incorporated in budgets. When the budget period has been completed, the actual differential costs may be computed and compared with the differential costs estimated at the beginning of the period. The problem of the cost accountant is to relate the anticipated costs of future increased production to present production where costs are known.

Managerial decisions should be made after all the factors and conditions involved in the proposed program have been explored and analyzed.

Any management planning its future output will find it necessary to budget a larger or smaller total cost as it increases or decreases the budget of physical volume. The increment of total cost accompanying the addition to output is a differential cost or a difference in total costs at two rates of output.

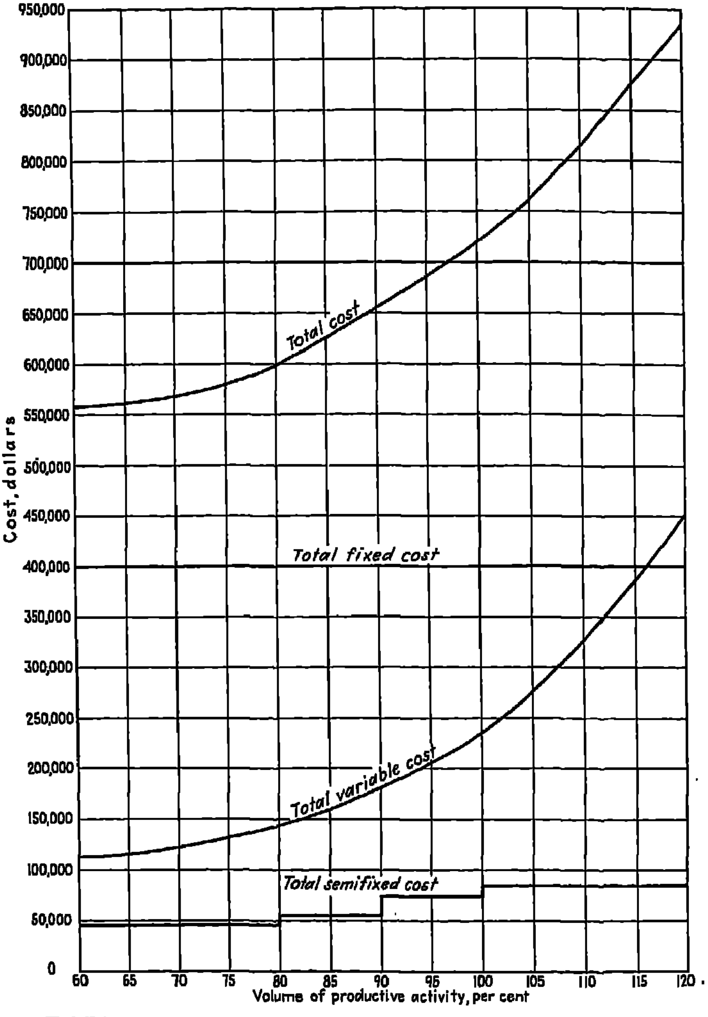


Exhibit 128. Costs for various volumes of productive activity.

The flexible budget, Exhibit 124, Schedule of Projected Costs, has been prepared to show differential costs, total costs, and average unit costs for seven levels of production.

Differential costs are determined by subtracting the amount of the cost at one level from that at a higher level. For example, the amount of materials under the variable cost section at the 70 per cent level of production found in column 2 is $35,000; at the 60 per cent level the amount is $33,000. Subtracting the latter figure from the former gives a differential cost of $2,000, which has been recorded in column 3. At the 80 per cent volume $40,000 is estimated to be the cost of materials. When $35,000 is subtracted from the above amount, a differential cost of $5,000 is incurred and is shown in column 5. It must be understood that the $5,000 is the differential cost between the 80 and the 70 per cent rates of activity. The differential cost between the 80 and the 60 per cent levels is determined by subtracting $33,000 from $40,000. The result of $7,000 is the same as the sum of the differential costs shown in columns 3 and 5.

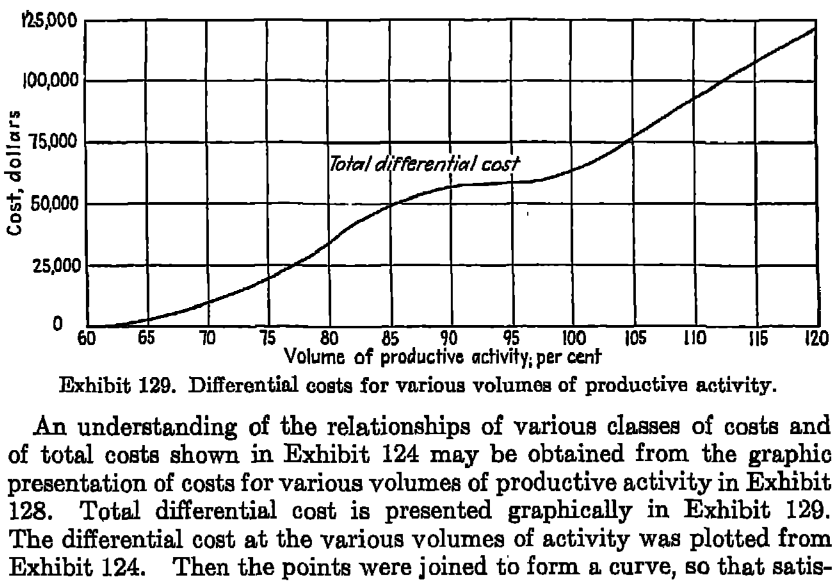


Exhibit 129. Differential costs for various volumes of productive activity.

An understanding of the relationships of various classes of costs and of total costs shown in Exhibit 124 may be obtained from the graphic presentation of costs for various volumes of productive activity in Exhibit 128. Total differential cost is presented graphically in Exhibit 129. The differential cost at the various volumes of activity was plotted from Exhibit 124. Then the points were joined to form a curve, so that satisfactory differential costs could be determined continuously at all levels of operations between 60 and 120 per cent of normal capacity.

APPLICATION OF DIFFERENTIAL COSTS

Differential costs may be clarified by illustrations. It is the role of the cost accountant to prepare differential costs and to advise management as to business policies.

Establishing Price and Volume. One of the important uses of differential costs is in determining selling prices. Assume that, by means of a market analysis and after a check of revenues, the sales department of the hypothetical company reports that the following schedule of prices is expected to absorb the output at the various volumes of production that have been under study:

Volume of Production	Selling Price per Unit
60%	$0.93
70%	0.92
80%	0.90
90%	0.88
100%	0.86
110%	0.82
120%	0.78

Total estimated revenue may be obtained by multiplying the unit selling price by the number of units produced:

No. units produced (see Exhibit 124)	Selling price per unit	Total revenue
600,000	$0.93	$558,000
700,000	0.92	644,000
800,000	0.90	720,000
900,000	0.88	792,000
1,000,000	0.86	860,000
1,100,000	0.82	902,000
1,200,000	0.78	936,000

A hasty survey of the total revenue figures might suggest that production should be pushed to its utmost limits. A comparison of the revenue with accounting costs, however, will show that this conclusion is erroneous. What price then should be established?

To obtain an answer, the increments in total revenue are compared with the differential costs in the following manner: The addition to revenue is found by subtracting the total revenue at one level of output from that at the next higher point. For instance, $558,000 is deducted from $644,000 to arrive at $86,000 as the increase in the total revenue at 70 per cent of capacity over 60 per cent of normal output. The differential costs are taken from Exhibit 124.

Volume of production	Increments in total revenue	Total differential costs
70%	$86,000	$ 9,000
80%	76,000	33,000
90%	72,000	57,000
100%	68,000	63,000
110%	42,000	94,000
120%	34,000	122,000

As long as the increment in total revenue exceeds the differential costs, it pays to increase output, but as soon as the incremental revenue equals differential costs, it is no longer profitable to raise the volume of production. As indicated in the prior tabulation, it is remunerative to accelerate the volume of productive activity to 100 per cent of normal production. Up to this point the increments in total revenue are in excess of the differential costs. The net profit of the business will be the highest at the 100 per cent level, as is demonstrated in Exhibit 130.

EXHIBIT 130

CONDENSED COMPARATIVE PROJECTED PROFIT AND LOSS STATEMENT AT VARYING VOLUMES OF PRODUCTION FOR BUDGET PERIOD OF ONE YEAR

	Percentage of normal production and sales						
	60%	70%	80%	90%	100%	110%	120%
Number of units to be produced and sold	600,000	700,000	800,000	900,000	1,000,000	1,100,000	1,200,000
Selling price per unit	$ 0.93	$ 0.92	$ 0.90	$ 0.88	$ 0.86	$ 0.82	$ 0.78
Total sales	$558,000	$644,000	$720,000	$792,000	$860,000	$902,000	$936,000
Total manufacturing costs (see Exhibit 124)	320,000	326,000	351,000	400,000	452,000	537,000	644,000
Gross profit	$238,000	$318,000	$369,000	$392,000	$408,000	$365,000	$292,000
Total selling and administrative costs (see Exhibit 124)	238,000	241,000	249,000	257,000	268,000	277,000	292,000
Net profit	$ 0	$ 77,000	$120,000	$135,000	$140,000	$ 88,000	$ 0

The most advantageous point is actually a little above 100 per cent, because incremental revenue is still $5,000 more than the differential costs. From the standpoint of securing the greatest earnings, the business would set the selling price per unit of output at approximately 86 cents and establish the production goal at 100 per cent or slightly higher.

Accepting an Offer. Suppose that under another set of market conditions the following situation is found to prevail:

Volume of production	Selling price per unit	Total revenue	Increments in total revenue	Total differential costs (Exhibit 124)
60%	$0.93	$558,000		
70%	0.92	644,000	$86,000	$ 9,000
80%	0.90	720,000	76,000	33,000
90%	0.86	774,000	54,000	57,000
100%	0.78	780,000	6,000	63,000

Because it is expected that the selling price per unit for outputs above 1,000,000 units will be less than the average total unit cost, the study is not continued above the 100 per cent level of normal production. The 80 per cent rate of activity will be the most profitable level of operations under the new set of factors because incremental revenue is $76,000, while differential cost is $33,000. At the 90 per cent level the increment in total revenue of $54,000 has fallen below the differential costs of $57,000.

The net profit for the 90 and 100 per cent levels may be computed in the following manner:

	90%	100%
Number of units produced and sold	900,000	1,000,000
Selling price per unit	$ 0.86	$ 0.78
Total sales	$774,000	$780,000
Total manufacturing costs (see Exhibit 124)	400,000	452,000
Gross profit	$374,000	$328,000
Total selling and administrative costs (see Exhibit 124)	257,000	268,000
Net profit	$117,000	$ 60,000

Exhibit 130 illustrates that there would be no profit at 60 per cent, $77,000 at 70 per cent, and $120,000 at 80 per cent; the latter rate of activity, consequently, is the point at which production would be maintained.

Assume that a large mail-order concern presents a purchase order for 200,000 units at $0.71 per unit. On first consideration the proposition might be rejected because the price is less than the lowest average total cost of $0.72 at the 100 per cent capacity, as presented in Exhibit 124. However, to reject the offer would be a mistake. Assume that the products sold to the mail-order house will be under another brand label, that the mail-order business represents an entirely new and separate market, and that sales made through the new outlet will have no effect upon the selling price in the old market. Under the conditions described what will be the effect of the offer? An analysis reveals:

Number of units produced and sold under the planned level of 80%	800,000
Additional units proposed	200,000
Total units (level of production at 100%)	1,000,000
Additional revenue to be realized (200,000 units at $0.71)	$142,000
Differential costs between 80 and 100% levels (see Exhibit 124)	120,000
Net addition to revenue	$ 22,000

The following schedule shows the total net profit if the offer is accepted:

Sales:	
800,000 units at $0.90	$720,000
200,000 units at $0.71	142,000
Total sales	$862,000
Total manufacturing costs (see Exhibit 124)	452,000
Gross profit	$410,000
Total selling and administrative costs (Exhibit 124)	268,000
Net profit if offer is accepted	$142,000
Net profit if offer is rejected (Exhibit 130, 80% volume column)	120,000
Increase in net profit	$ 22,000

The increase in net profit of $22,000 is the same as the net addition to revenue shown above. The company would find it advantageous to accept the offer from the mail-order business.

The decision is predicated on the proposition that the original 800,000 units may still be sold at $0.90 each. If accepting the new order caused the selling price of the 1,000,000 units to drop to $0.71, the company would lose $10,000 determined in this manner:

Sales (1,000,000 units at $0.71)	$710,000
Total manufacturing, selling, and administrative costs	720,000
Loss	$ 10,000

It is possible that the company may have to embark upon an advertising program in order to maintain the price at $0.90 on the product bearing its trade name. Since the increase in profits amounts to $22,000, any expenditure for sales promotion not exceeding this figure will show a gain for the company. Any expenditure in excess of $22,000 will place the company in a less desirable position than it was before.

Submitting a Bid. Assume the same conditions as those in the preceding illustration except that no offer has been received from the mail-order house. In other words, the company is operating at 80 per cent of normal output and with a profit of $120,000. The sales manager believes that one of the best ways of sales promotion is to sell the product to various state governments. It is discovered that bids for 100,000 units are being received by the business manager of the state of Illinois. The company wishes to submit the lowest possible bid at a price which will cover the cost of producing the 100,000 units and which will not affect the profit on the 800,000 units already scheduled for production.

Receipt of the order will raise the production level to 90 per cent. An examination of Exhibit 124 reveals that the average total cost per unit at 90 per cent is $0.73, but a still lower bid can be made. It is not expected that the units taken by the state of Illinois will affect the sales of the other 800,000 units. The differential costs, as indicated by the exhibit, between the 80 and the 90 per cent levels are $57,000. This amount divided by 100,000 units results in an average cost figure of $0.57 per unit for the additional output. A bid of $0.57 a unit will not change the desired profit of $120,000. The profit analysis is presented below:

Sales:	
800,000 units at $0.90	$720,000
100,000 units at $0.57	57,000
Total sales	$777,000
Total manufacturing costs (see Exhibit 124)	400,000
Gross profit	$377,000
Total selling and administrative costs (see Exhibit 124)	257,000
Net profit	$120,000

Replacement of Machinery. One of the most frequent uses of differential cost analysis is in making the decision of whether it is more profitable to replace machinery and equipment with new and improved types or to continue to use present equipment until it is worn out. An illustration with alternative solutions is presented to show the use of cost data in aiding management in its decisions.

Assume that the X Manufacturing Co. uses a tapping machine which originally cost $2,400, with an estimated life of 10 years and no salvage value. After 5 years of use it has a depreciated book value of $1,200. A new semiautomatic tapping machine, also with an estimated life of 10 years and no salvage value, priced at $12,000, is available. The installation of the new machine would cost $600. The old machine is in good repair and can be used for an additional 5 years. An offer of $200 trade-in allowance is made on the old machine. The management has requested that a cost study be made as an aid in deciding whether or not it is advisable to purchase the new machine. The following estimates, applicable to each year of operation, are available:

	Old machine	New machine
Repairs and maintenance	$ 80	$100
Supplies	250	275
Power	400	375
Taxes	60	300
Average number of units completed each hour	10	20
Estimated hours of operation each year	2,400	2,400
Operator's wage rate per hour	$1.00	$1.50

In comparing the operating costs and the average cost per unit of production for the two machines, the problem arises as to the proper consideration of depreciation as a cost element on both the old and the new equipment. The following points of view regarding depreciation are presented as typical of those commonly considered in equipment replacement studies:

a. Under competitive conditions, new methods will be introduced regardless of the losses resulting to the individual firm from the obsolescence of old equipment which is being replaced in the industry by new and improved equipment. Entrepreneurs who continue to use outdated equipment until it is fully depreciated will not maximize their profits and may be forced out of business by more progressive firms not burdened by obsolete equipment. If management adopts this premise, the present book value of old equipment, less any cash or trade-in value, will be ignored in computing the operating costs of new equipment and in deciding whether or not to replace the old equipment. The undepreciated value of old equipment is considered to be "sunk costs" or a loss not expected to be recovered from future operations.

b. If competition is not considered to be important in the decision to replace equipment, management may take the position that new equipment will be purchased only if the economies expected are sufficient to compensate for the undepreciated value or loss on value of old equipment. If management adopts this premise, the undepreciated or book value of the old equipment, less cash or trade-in value, will be added to the cost of the new equipment, and the *total* cost will be depreciated over the life of the new equipment in determining the operating costs and the average cost per unit of production for the new equipment. While this policy is not in accordance with accepted accounting principles, it is commonly used as a basis in deciding whether or not to replace old equipment.

a. Solution to problem: undepreciated value of old equipment disregarded:

	Old machine	New machine
Estimated number of units to be produced each year	24,000	48,000
Estimated operating costs each year:		
Repairs and maintenance	$ 80	$ 100
Supplies	250	275
Power	400	375
Taxes	60	300
Labor costs	2,400	3,600
Depreciation:		
$\frac{\$2,400}{10 \times 24,000} \times 24,000$	240	
$\frac{\$12,600}{10 \times 48,000} \times 48,000$		1,260
Estimated total costs each year	$3,430	$5,910
Estimated average cost per unit	$0.143	$0.123

b. Solution to problem: undepreciated value of old equipment, less trade-in value added to cost of new equipment:

	Old machine	New machine
Estimated number of units to be produced each year	24,000	48,000
Estimated operating costs each year:		
Repairs and maintenance	$ 80	$ 100
Supplies	250	275
Power	400	375
Taxes	60	300
Labor costs	2,400	3,600
Depreciation:		
$\frac{\$2{,}400}{10 \times 24{,}000} \times 24{,}000$	240	
$\frac{\$12{,}000 + \$1{,}000(\$1{,}200 - \$200 \text{ trade-in})}{10 \times 48{,}000} \times 48{,}000$		1,360
Estimated total costs each year	$3,430	$6,010
Estimated average cost per unit	$0.143	$0.125

CONTRIBUTION MARGIN ANALYSIS VS. NET PROFIT ANALYSIS

In the preceding section, dealing with differential cost analysis, the term *differential cost* was interpreted to mean the differences in aggregate or total costs resulting from the comparison of opportunities or alternatives that are presented to management. Cost differentials were isolated, total costs were computed, and net profit or loss conditions were determined for the two or more levels of production, methods of distribution, or other opportunities being considered by management.

The cost accountant is faced with the additional problem of the most effective way to present these data to management so that analyses of cost and income factors can be made and policies determined. In the presentation and analysis of cost data, there are two schools of thought as to the most effective approach, namely, *contribution margin analysis* and *net profit analysis*.

Contribution Margin Analysis. Contribution margin analysis, also frequently termed *direct costing*[1] and *out-of-pocket costing*, is a method of presenting and relating cost data to the income identified with the functions producing the costs. It is used frequently by business concerns as an aid in making decisions pertaining to the addition or elimination of one or more segments or divisions, where the established manufacturing or distribution activities of the business are not materially affected by the decision. In the publication "Assignment of Nonmanufacturing Costs for Managerial Decisions," prepared by the Research Department of the National Association of Cost Accountants,[2] it is reported that approximately one-half of the 70 concerns interviewed make use of the contribution margin approach in deciding many of their problems.

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[1] For a complete statement, see "Direct Costing," Research Series No. 23, *National Association of Cost Accountants Bulletin*, April, 1953.

[2] Research Series No. 19, *National Association of Cost Accountants Bulletin*, May, 1951, p. 1162.

The contribution margin of a particular activity is obtained by subtracting direct costs, such as material and labor, and variable overhead costs from the sales or income for that activity. The balance is considered to be the "contribution" of that activity toward the fixed costs and profit of the entire business enterprise. The costs deducted from income in order to establish the contribution margin are considered to be the "out-of-pocket" costs, or costs that can be directly associated with the segment of the business under surveillance, or costs that will not be incurred if the project is not undertaken.

The theory invoked in supporting the contribution analysis is that in an established enterprise there are fixed overhead costs that will not be affected by such changes as the addition of a new product, the extension of sales activities into a new territory, the manufacture of a part, or the construction of a plant addition with the concern's own men and equipment. It is also contended that the majority of fixed overhead costs cannot be assigned to divisions or segments of a business with any degree of equitableness, and the only accurate measure of the effectiveness of an individual segment of a business is its net income or contribution to the mass of joint costs which comprise the fixed overhead costs. Therefore, "direct costing" is the only effective way of deciding which divisions of a business contribute the most toward the fixed costs and total net profit from operations.

Net Profit Analysis. In contrast to the contribution margin analysis, the net profit or "full costing" analysis provides statements which show the allocation of *all* costs to all divisions such as processes, territories, lines of products, and salesmen. Advocates of this approach contend that every dollar of cost must be allocated to one or more segments of the business and that no margin of profit can be shown until all costs have been recovered or matched against income.

They contend that a product, territory, or manufacturing division does not exist as a separate business activity, and that each segment of a business enterprise must bear its share of all costs, both variable and fixed, allocated by the most equitable and practical bases that the cost accountant can select.

The net profit approach has been explained and illustrated in many sections of this text because it is the basic concept of cost analysis and reporting used by the authors. Therefore it is not necessary to illustrate this method in the present chapter.

Reports Prepared in Accordance with Contribution Margin Concept. The usual procedure in presenting income and cost data when the contribution margin or direct costing concept is followed is to show all costs that can be associated directly with the activity deducted from the net sales or income of the activity and the margin of profit as the remainder. The following headings may be included in a contribution margin statement classified by product lines, territories, or other segments of a business enterprise:

Net sales
Less: Direct manufacturing costs
  Gross margin
Less: Direct selling costs
    Direct administrative costs
  Net operating margin (contribution margin)

Exhibit 131 is an illustration of a profit and loss statement prepared in accordance with the contribution margin concept.

Conclusions Regarding Cost Analyses. There may appear to be a sharp conflict of opinion as to the most effective method of making cost analyses and reporting and interpreting cost and income relationships as an aid in policy determination. When an objective view of the different methods or approaches is taken, it appears that there is no conflict of principles or purposes. After a differential cost analysis has been made for the purpose of determining the differences in costs that are expected to result from policy changes such as increase in volume of production, addition of a new territory, or dropping of a product from the merchandising line, the question arises as to whether only the direct costs should be related to the expected additional revenue and the contribution margin shown or whether a redistribution of all costs should be made to all segments and the net profit, reflecting the profitableness of each segment, should be shown after the reallocation of costs.

It is the authors' opinion that it is the duty of the cost accountant to present complete information to management when important policy decisions must be made. Since both the contribution margin or direct costing analysis and the net profit analysis have strong and weak points, in view of each proposition under consideration, there are many instances when reports containing both types of analysis are valuable to management in deciding the most profitable course of action under existing circumstances.

The relative merits of the two methods are presented by John A. Beckett[1] in an article "The Art and Science of Distribution Costing" as follows:

> The allocation-proration or full cost technique has the advantage of being helpful where the direct cost technique is weak, that is, at the extremes of the spectrum where the units are specific and the direct costs are few. Furthermore, the technique is realistic in that it assesses to units their fair share of indirect costs so that when they are all compared, one against the other, to determine the relative worth of each, the bases of judging may be mature and complete bases which have real meaning in the long-run.
>
> A disadvantage of this technique is that the results may be mistaken for indications of the action which should be taken to correct poor showings by

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[1] *National Association of Cost Accountants Bulletin,* April, 1951, pp. 904–906.

EXHIBIT 131

THE NATIONAL DISTRIBUTING CO.

PROFIT AND LOSS STATEMENT

Jan. 1 to Jan. 31, 19__

	Total	Territory 1	Territory 2	Territory 3	Territory 4
Gross sales	$103,000	$30,000	$40,000	$10,000	$23,000
Less: Sales returns and allowances	3,000	1,000	1,500	200	300
Net sales	$100,000	$29,000	$38,500	$ 9,800	$22,700
Less: Direct manufacturing costs:					
Material	$ 25,000	$ 7,250	$ 9,625	$ 2,450	$ 5,675
Labor	15,000	4,350	5,775	1,470	3,405
Variable overhead	10,000	2,900	3,850	980	2,270
Total direct manufacturing costs	$ 50,000	$14,500	$19,250	$ 4,900	$11,350
Gross margin	$ 50,000	$14,500	$19,250	$ 4,900	$11,350
Less: Direct selling costs:					
Sales commissions	$ 10,000	$ 3,000	$ 3,500	$ 1,500	$ 2,000
Travel	7,000	2,200	2,250	1,100	1,450
Freight	2,000	700	900	100	300
Warehousing	1,000	100	350	300	250
Total direct selling costs	$ 20,000	$ 6,000	$ 7,000	$ 3,000	$ 4,000
Less: Direct administrative costs:					
Branch office salaries	$ 7,860	$ 2,270	$ 2,870	$ 1,715	$ 1,005
Telephone and telegraph	1,000	200	400	150	250
Branch office rent	700	200	200	100	200
Supplies	300	100	150	25	25
Depreciation of equipment	140	30	80	10	20
Total direct administrative costs	$ 10,000	$ 2,800	$ 3,700	$ 2,000	$ 1,500
Total direct selling and administrative costs	$ 30,000	$ 8,800	$10,700	$ 5,000	$ 5,500
Net operating margin (contribution margin)	$ 20,000	$ 5,700	$ 8,550	$ *100**	$5,850
Less: Fixed costs:					
Executive salaries	$ 15,000				
Insurance	500				
Clerical salaries	2,000				
Donations	100				
Depreciation	900				
Property taxes	500				
Total fixed costs	$ 19,000				
Net profit	$ 1,000				

* Loss.

certain units which are being studied. Whether this is a serious objection or not depends entirely upon the comprehension by the cost analyst of the nature of costs and their behavior. It is certainly true that some very grave mistakes have been made when the second step—exploration into the effects of changing policy—has been omitted, but the literature of distribution costing sounds this warning again and again. Moreover, good straight thinking on the part of the analyst will preclude the error anyhow.

The real practical strength of the full cost approach lies in its usefulness as a tool for guiding decisions so that gradual changes may be made. If a unit is weak (as compared to its sister units of the same segment), this approach indicates that fact. The ensuing managerial action usually takes the form of an attempt to build strength where weakness is found, and that takes time. It is not commonly necessary, therefore, as a practical matter, to carry the cost analysis to the second phase. If Territory No. 15 is doing poorly as compared to other like territories, the fact is important to know and the knowledge will normally stimulate investigations to find out why, including inquiry as to how the territory can be built up. Comparatively weak units must be weak indeed if they are to be considered for guillotine treatment. Ordinarily, the action indicated is less drastic. Usually it is evolutionary rather than revolutionary.

This strength of the full cost method of distribution cost analysis is, in turn, a weakness, for it is strength built upon practical expediency. It is a trading upon the law of averages. The analyst who belongs to the direct costing camp is deeply fearful that opportunities to improve the welfare of the company as a whole will be missed because of failure to measure *each* alternative by the direct cost approach, whether or not excision is contemplated. The appeal of the direct cost technique lies in its spelling-out of the expected behavior of costs under assumed conditions. Although its primary objectives are to measure the contribution of units to common costs and to permit a comparison of those units with one another, the by-product of such an analysis (because of the use of escapable costs) is an indication of the results which would be obtained by expansion, contraction, or elimination of the units. Under certain conditions this is very valuable information. Hence arises its popularity among distribution cost analysts.

Direct costing has this further advantage: it points out, or should, the interrelationship between production costs and distribution costs and indicates not only the fact that certain changes will have production implications but also the extent of such implications. This is not automatic, of course, but when the technique used requires one to deal with alternative courses of action, the mind is more likely to be drawn to the effects which such changes will cause across the board, than if other techniques were employed.

CHAPTER XXIII

COST AND INCOME CHARTS

Cost analysis includes the study of cost behavior as production volume increases or declines. Such cost behavior when related to sales income shows the profit-volume relationship which is the net effect that change in volume, cost, price, and product mix has on profits. Management constantly strives to relate these elements so as to maximize profits. In order to make responsible decisions regarding this relationship, management should know the effect of a proposed change in selling price; the costs at varying levels of production; the most profitable products or models; the point that the products will satisfy the demand at a given price; the relationship or product mix that will most effectively utilize the plant and equipment, if more than one product is manufactured; and the break-even point of operations.

Accounting Reports. Financial accounting has adequately developed the annual balance sheet and profit and loss or income statement for use in reporting past operations to management. Cost accounting, with its technique of classifying costs by functional units as well as detailed costs for units of production, has given management much needed information upon which to base responsible decisions. Confused by such detailed information presented in tabular form, executives, many of whom are not trained in accounting, have demanded simplified reports. This demand has been met by the cost accountant through the use of graphs which clarify technical terminology and summarize the mass of cost and income data.

Break-even Chart. Management has found the break-even chart to be one of the most useful graphic presentations of accounting data. When future sales income has been estimated, costs to produce this income can be forecasted and projected profit and loss statements can be prepared. The projected profit and loss data are then presented graphically on the break-even charts, which are also known as profit graphs and profit-volume graphs. Exhibit 132 is a simple break-even chart on which the vertical axis measures income and costs in dollars and the horizontal axis measures volume in terms of units of production. The break-even point is essentially the point where the income line crosses the total cost line. As indicated on the chart it is estimated that it will cost the manufacturer $30,000 to produce 60,000 units. If 60,000 units are sold for $30,000, there will be neither a profit nor a loss.

The break-even chart is a graphic presentation of an economic rather than an accounting concept. Its preparation is based upon the assumption that certain costs vary with volume of production but that other costs remain constant or fixed regardless of the volume produced. The assumption is made that all costs can be classified as either fixed or variable. Exhibit 125, page 442, shows graphically how a fixed cost is constant with volume. Such costs are the same in total amount whether there is no production or the plant is operating at capacity. The fixed cost line on the chart is a straight line running parallel to the horizontal axis at a height equal to the fixed costs for the period. Variable costs which increase as budgeted production is increased are shown graphically in Exhibit 127, page 443. The variable cost line on the chart is a straight line running at an angle to the horizontal axis, increasing from zero to total variable costs.

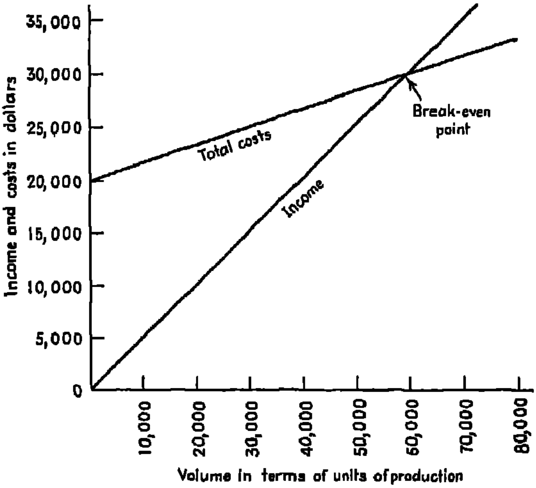

Exhibit 132. Simple break-even chart.

It is also assumed that unit sales will equal production, which may be demonstrated by showing the sales income line on the chart to represent sales income for the number of units produced. Over a budget period the units produced and sold by a particular company will vary, but this discrepancy is corrected by the recognition of inventories. It is assumed that unit selling price will remain uniform and that there is a single product sold at a fixed unit price; or that there are several products sold at a fixed unit price; or that there are several products sold at varying prices with varying sales and production mix, but always with the same total relationship of costs to sales.

Construction of the Break-even Chart. The break-even chart is usually drawn on arithmetic graph paper, and a quadrant is constructed with the familiar horizontal and vertical axes. The horizontal axis is graduated to indicate the volume of production and the vertical axis to indicate both costs of production and sales income for the units produced.

The period covered by the graph must be determined before graduating the horizontal axis. The length of the period covered should represent an operating cycle or be of sufficient length to include all normally recurring costs. It should be long enough to include representative operating cost data, but should not be so long as to include variations due to business cycle changes. The natural business year might well represent the period to be pictured in the graph. Shorter periods may be used if *normal* cost techniques are adopted. The concept assumes that the total fixed costs during the period will be constant.

The next step is to determine the plant *capacity* during the period selected. One of the following may be used:

a. The maximum theoretical capacity of the plant.

b. The maximum capacity of the plant, less allowances for normal idle time, vacations, and other ordinary operating interruptions.

c. Average or normal conditions of production, consideration being given to a past period, such as the last 5 years.

d. Estimated production, based on the sales expected for the projected period.

The fourth basis for setting the capacity seems the most useful. The present state of the market for the company's products, the expected changes in the market conditions due to new styles or to the development of substitute products by competitors, and the changing management policies should all be carefully considered in the forecasting of capacity.

The horizontal scale may now be graduated from zero to the projected or 100 per cent capacity and expressed in either units of production or sales dollars of production or as a percentage of capacity. In a limited number of cases the volume may be expressed in physical units such as gallons or pieces, but where there is a product mix, quantities are usually converted to sales dollars of production, since this makes possible a composite index of volume for the several products. A composite index is also possible when the horizontal axis is graduated as a percentage of capacity.

Plotting the Revenue Line. The slope of the revenue or sales income line is determined by the unit selling price and shows the rate of increase in total sales as volume of production changes. A change in unit selling price is reflected in the chart by a change in the slope of the revenue line. The revenue line is constructed by reading from left to right on the horizontal axis to the graduation expressing the projected capacity, then up on the vertical scale to a point representing total revenue for this capacity, and the point is plotted opposite these two values. A straight line is drawn from the zero point to the plotted point and represents the increase in sales income as production increases from zero to the projected capacity. When the capacity and volume are expressed in terms of sales dollars, both scales on the chart are identical and the revenue line slope is at a 45-degree angle to the base line.

In Exhibit 133, a simple break-even chart with fixed and variable costs shown, the horizontal scale is graduated to represent volume in terms of sales dollars. This means that the projected capacity of the plant, when sold, would return $70,000 in sales income to the company. The vertical scale, which represents both actual sales income and total costs of production, distribution, and administration, is also graduated in dollar amounts. Thus a point may be plotted opposite the $70,000 mark on each scale and a straight line drawn from zero through the plotted point. The line represents the increase in sales revenue from zero to $70,000 as production increases from zero to the projected capacity.

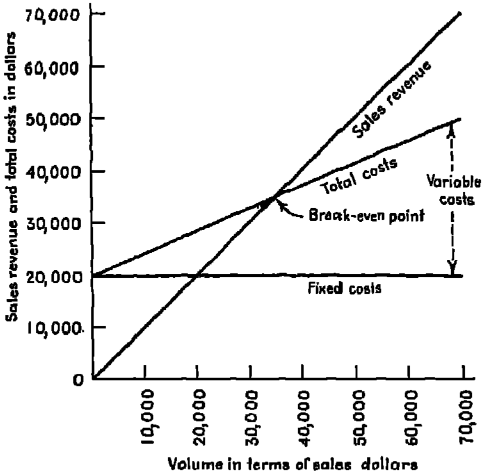

Exhibit 133. Break-even chart with fixed and variable costs.

Plotting Fixed Costs. Fixed costs are those costs which do not change in total amount although volume may increase from zero to the projected capacity. In determining which costs are fixed during the period selected, the cost items may be reviewed and such type costs identified. Inasmuch as the break-even chart represents projected costs, fixed costs may be determined by the use of a flexible budget as explained in the preceding chapter, page 439. The flexible budget shows an estimate of what the fixed costs will be rather than the historical fixed costs, which are not necessarily indicative of future operations. Such costs, exemplified by executive salaries, rent, depreciation, and other administrative costs, are totaled, and a point is determined on the vertical or total cost scale which represents the amount of all fixed costs. The fixed cost line is then constructed by drawing a line through the amount so determined and parallel to the base line. In Exhibit 133, the fixed costs were determined to be $20,000. A line extended from the $20,000 graduation on the vertical axis to the right and parallel to the base line represents the amount of the fixed costs for the period selected. Thus the line indicates that as production increases from zero to the projected capacity of $70,000 these costs will remain unchanged in the total amount of $20,000.

Plotting the Variable Cost Line. All costs not absolutely fixed will necessarily vary in some degree as production increases from zero to projected capacity. Costs such as direct material and direct labor will vary almost directly with volume of production; costs such as power and supplies will vary, but not directly with production; costs such as supervisory salaries and heat vary irregularly as production increases from zero to projected capacity. The forecasted behavior of these variable and semifixed costs is shown in the flexible budget discussed in the preceding chapter, page 439. Any cost that does not vary with production or is not absolutely fixed comprises both variable and fixed cost elements. Such costs are analyzed, and the amount of each element is determined.[1] Fixed elements are then classified with fixed costs and the variable elements with the variable costs.

The total cost line is plotted by adding the total variable costs for projected capacity to the total fixed costs and a point determined on the vertical scale representing the amount of all costs. A point is plotted opposite the amount indicated and directly above the projected capacity. A straight line is then drawn through the plotted point and the point on the vertical axis where the fixed cost line and the vertical axis intersect. At this point of intersection on the vertical scale production is zero and variable costs are zero. The line represents total costs, but the slope thereof is dependent only on the variable elements.

In Exhibit 133, the variable costs were determined to be $30,000 for a production volume of $70,000 sales dollars. This amount added to fixed costs of $20,000 results in a total cost of $50,000. A point is plotted opposite the $50,000 point on the vertical axis and above the $70,000 projected capacity point on the horizontal axis. A line is drawn through the plotted point and the intersection of the fixed cost line, and the vertical axis at $20,000 represents the increase in total costs as production increases from zero to the projected capacity of $70,000.

Break-even Point. The break-even point is the point where the total cost line intersects the revenue line. It is the point or level of operation where income equals total costs. The point is also known as the volume of operations where profits begin or the minimum point of production when total costs are recovered. The point is expressed either as a per cent of capacity, in physical units produced, or in sales dollars of production, depending on how production capacity is indicated on the base line. In Exhibit 133, the break-even point is $35,000, which is the point where production, when sold, will return $35,000 in revenue to the company.

Variations in Chart Construction. In Exhibit 133, fixed costs have been shown as the first group above the horizontal axis. Such a presentation has the advantage of showing that fixed costs remain constant at any level of production and that the variation in total costs is due entirely to the variable cost elements. The chart may be detailed to show how the fixed costs are composed of fixed factory overhead, fixed administration, and other elements of fixed costs; how variable costs are made up of direct material, direct labor, sales commissions and its other components; and how the profit area above the break-even point may be divided into income taxes, dividends, and retained earnings. The amount of detail shown is entirely dependent upon the use that is to be made of the chart. Similar charts may also be prepared for lines of products, sales territories, sales departments, salesmen, customers, and by functions of distribution.

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[1] This analysis may be accomplished by the equation of least squares or the graphic method. For further discussion see S. A. Peck, "Expense Control at Varying Volumes of Sales and Production," *National Association of Cost Accountants Bulletin*, March, 1941, pp. 717–719.

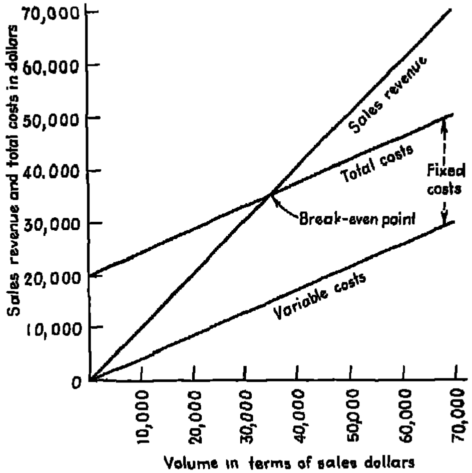


Exhibit 134. Break-even chart with variable costs shown first above the base line.

Exhibit 134, a break-even chart with variable costs shown first above the base line, shows that at any level of production the spread between sales revenue and variable costs may or may not cover total fixed costs, depending upon whether production volume is above or below the break-even point. Those who favor the contribution margin or direct costing approach to cost analysis may use this type of chart. The fixed costs presented on the chart represent the total fixed costs for the entire company. Any spread between the variable cost line and the sales revenue line indicates how much the particular function, such as the product line or sales territory, contributes to the fixed costs and profit for the entire company. When used in this manner the chart would not be a break-even chart in the strict sense, but rather a chart showing only the contribution margin of a particular function.

Effect of Policy Decisions. Break-even charts may be used advantageously to portray the effect of changes in policy on the profit-volume relationship. The accountant may prepare charts to show the shift in the break-even point and resulting gain or loss from changes in selling price, product mix, increase in sales above projected capacity, addition of new products or the elimination of old lines, and in increasing fixed costs with a simultaneous decrease in variable costs, or vice versa. An example of the latter would be the replacement of variable direct labor cost by additional mechanization which would increase fixed costs.

The break-even point will shift if there is an increase or decrease in fixed costs, if there is an increase or decrease in the rate of variable costs, or if there is an increase or decrease in unit selling price. An increase or decrease in fixed costs will change the location of the break-even point but will not change the relationship of variable costs to sales income or the progressive rate of net profit, which is the rate of spread between total costs and sales income above the break-even point. An increase or decrease in variable costs will change the location of the break-even point, the relationship of variable costs to sales income, and the progressive rate of net profit. An increase or decrease in sales income due to a change in unit selling price has the same effect as a change in variable costs. In other words, the spread between variable costs and sales income, which represents the contribution made to the company's fixed costs and the profit area, is affected only by a change in selling price, a change in variable costs, or some changes in both of these elements which do not offset each other.

Once the break-even point is reached, the amount of profit realized is dependent upon the progressive rate of the spread between total costs and sales income. If the progressive rate of spread is low, as frequently found in public utilities where fixed costs are relatively high, a substantial change in volume is necessary to produce any measurable effect on net profit. In such a situation additional working capital requirements made necessary by the increase in production capacity may not be met by the additional income. Companies in such a position with inadequate working capital may encounter financial difficulty. If the progressive rate of spread between total costs and revenue is high, as sometimes found in the garment industry, where fixed costs are low and markup is substantial, a very small change in volume will effect the company's profit. Managerial decisions that cause the break-even point to change should be made only in the light of the progressive rate of spread between the total costs and sales income.

Advantages and Limitations of the Break-even Chart. The final result of the break-even chart is the simple presentation of the cost-profit structure of the company. As such it summarizes a great mass of detailed information in such a way that its significance may be grasped even with a cursory glance. However, the chart is only one of the tools available in making responsible managerial decisions, and its oversimplification may be a pitfall for those who use the chart as a complete substitute for sound business judgment. Those who insist that the break-even point should be lowered should remember that increased profits

CHAPTER I

Questions

1. How do you explain the fact that cost accounting is relatively a new field or branch of accounting?

2. Contact an executive of a concern in your community that has a cost system and ask him what the major functions or objectives of his cost system are. Contrast his answer with the functions of cost accounting presented in Chap. I.

3. What is meant by financial or general accounting? What general procedure is followed in determining periodic profit or loss?

4. In your own words give a definition of cost accounting. How does cost accounting differ in technique and procedure from financial accounting?

5. Is cost accounting limited in its application to certain industries and certain divisions? Explain.

6. What are the *important limitations and deficiencies in financial accounting?*

7. In the delegation of authority and responsibility, what position should the cost accountant have in relation to other executives in a concern?

8. Explain what is meant by a system of control of materials and supplies. What forms of "internal check" can be introduced to prevent misappropriation and waste of materials and supplies?

9. What types of control of wages and salaries are obtained with the establishment of a system of cost control?

10. What are meant by "standards" of efficiency? What types of standards are incorporated in a system of cost control?

11. List five costs that are variable and controllable; five fixed costs. Of what value is such a classification of costs?

12. Of what importance is budgeting in a system of cost control?

13. Of what value is cost information in determining prices and expansion or contraction policies?

14. Assume that you have been the chief accountant for the Stratford Manufacturing Co. which has been producing small electric motors under a contract with the Navy for several years. The Navy contract has been terminated, and the management is considering the proposition of manufacturing various sizes of electric fans to be sold directly to retailers through the medium of a sales force. The management is uncertain as to the advisability of undertaking this project, which will require an investment of approximately $500,000.

Assume that you have been requested to prepare data regarding the costs to manufacture and to distribute the proposed products and an estimated profit and loss statement for the first 6 months of potential operations.

What procedures would you follow in making this special cost study? What data would you obtain and what type of reports would you present to the management?

15. Summarize the advantages to management that may accrue from a complete system of cost accounting and budgetary control.

What stake do employees have in a well-operated cost system in their plant?

16. Of what value are cost data to such creditors as bondholders, bankers, and governmental lending agencies?

17. How can you justify cost accounting from the point of view of the general public?

CHAPTER II

Questions

1. What is meant by the cost principle?

2. Explain the importance of matching costs with revenues.

3. Give the cost formula for a manufacturing enterprise.

Is it logical to treat distribution and administrative costs as a part of inventory values? Is it practical? What would be the effects of such a plan on the financial statements?

4. Distinguish between "product costs" and "period costs." Give two examples of each type of cost.

5. Explain why cost accounting terminology is not so uniform and standardized as that used in financial accounting. What agencies are endeavoring to standardize cost terminology and unify cost accounting methods?

6. Define or explain briefly the meaning of each of the following cost accounting terms:

a. Direct material costs.
b. Direct labor-hours and direct labor cost.
c. Prime cost.
d. Overhead or indirect costs.
e. Distribution costs.
f. Administrative costs.

7. What are joint costs? Mention several industries in which the problems of joint costs are of prime importance.

8. What is meant by budgetary control? Why is budgeting an important part of cost accounting?

9. Differentiate between actual costs, estimated costs, and standard costs.

10. What is meant by departmentalization as applied to cost accounting methods? How does the concept of a department for cost purposes differ from the meaning of the term from an administrative point of view?

11. What is a classification of accounts? Why is it an important part of every system of accounting?

12. How does the classification of accounts differ when a system of cost accounting is combined with a system of financial accounting?

13. Give three examples of controlling accounts used commonly in financial accounting. Describe the subsidiary record or records which each might control.

14. If you were requested by the management of an industrial concern to give advice as to the use of controlling accounts, what information would you give in regard to the following questions:

a. Under what circumstances is it advisable to replace a group of general ledger accounts with a controlling account?

b. What types of subsidiary records can be used in support of controlling accounts?

c. How can business transactions be posted both to a controlling account and to subsidiary records without throwing the trial balance out of balance? Will total debits be equal to total credits?

d. If the subsidiary ledger is out of balance with the controlling account, how may the error or errors be detected?

15. Enumerate the important advantages of the use of controlling accounts.

16. What are the important types of cost controlling accounts?

17. Explain how the Materials account and materials stock ledgers may be used as a controlling account-subsidiary record for controlling materials and supplies in a manufacturing concern.

18. Why are accounts frequently classified by symbols or code numbers?

19. Explain briefly how a classification of accounts can be prepared by each of the following plans of coding accounts:

a. The numerical system.

b. The decimal system.

c. The mnemonic system.

d. The combination letter and number system.

20. What is a voucher system? Why is it gaining in popularity as a means of controlling expenditures? What forms of internal check exist when the system is employed?

21. What is a voucher? a voucher check? Describe several forms of vouchers showing the purpose of each.

22. Describe the process of preparing a voucher for payment and recording it in the voucher register.

23. What debit and credit columns are generally used in voucher registers? How will the columnar structure vary for a gasoline, tire, and battery station as compared with a department store?

24. Describe the process of posting from the voucher register, assuming the use of numerous controlling accounts in the general ledger.

25. What types of subsidiary creditor ledgers may be used when a voucher system is in use? How may unpaid vouchers be filed and indexed? What is a convenient plan for filing paid vouchers?

26. What purposes does the check register or cash disbursement journal serve when incorporated in a voucher system? What debit and credit columns are used in the check register? Describe the posting from the check register.

Problem 1

A manufacturing concern follows the practice of charging the cost of direct materials and direct labor to work in process but charges off all indirect costs (factory overhead) directly to profit and loss. State the effects of this procedure on the concern's financial statements and comment on the acceptability of the procedure for use in preparing statements.

(Uniform Certified Public Accountant Examination, November, 1951)

Problem 2

On Dec. 31, the Witt Co. had in the general ledger the following inventory accounts with debit balances:

Raw material A	$15,456
Raw material B	4,567
Raw material C	3,457
Raw material D	14,118
Raw material E	313
Shop supplies	1,334
Office supplies	567
Gasoline	2,987
Motor oil	200
Subassemblies	1,478
Repair parts	987
Packing supplies	452

Due to the increasing number of inventory accounts it was decided to install control and subsidiary accounts for the above inventory accounts.

Required:

a. The title of the control account and its balance after the control account is placed in the general ledger.

b. The journal entries, if any, that are required to make the change.

c. A brief statement of how the installation of the control account is accomplished.

Problem 3

In a large manufacturing business the expense controlling accounts are, as usual, kept in the general ledger and the detail accounts are kept in subsidiary ledgers. Name seven accounts (twenty-one in all) which might appear among those in each of the following subsidiary ledgers: (a) Manufacturing Expense, (b) Selling Expense, and (c) General Expense, respectively.

(*Uniform Certified Public Accountant Examination,* November, 1946)

Problem 4

a. Classify each account under the following headings which represent the three primary divisions of a business organization (some of the cost accounts may be classified under two or more headings):

(1) Manufacturing costs.
(2) Distribution costs.
(3) Administrative costs.

Supervisors' salaries
Officers' salaries
Foremen's and assistants' salaries
Engineers' salaries
Outside construction employees' wages
Clerical employees' wages
Inspectors' wages
Elevator and crane operators' wages
Warehouse employees' wages
Stockkeepers' and helpers' wages
Tool crib attendants' wages
General helpers' and laborers' wages
Advertising employees' wages
Commissions—selling force
Chauffeurs' and garagemen's wages
Legal employees' salaries
Commissions—agents'
Shop supplies
Office supplies
Hospital service
Employment bureau
Receiving department
Losses on parts due to overstock
Telephone and telegraph
Plant protection
Grounds and gardens
Travel
Packing (outgoing)
Steam
Nondurable tools
Conveyer equipment maintenance
Taking inventory
Pensions
Rent
Property insurance
Postage
Space advertising
Corporate taxes, except Federal
Income tax
Warehouse cartage
Concessions to customers
Depreciation

b. Prepare a classification of accounts, with appropriate main and subheadings, according to the combination mnemonic and number plan.

Problem 5

The classification of accounts given below is used by a concern that bottles and distributes beverages.

a. Classify each account under one or more of the following headings:

(1) Manufacturing.
(2) Distribution.
(3) Administration.

Samples
Sugar
Factory payroll
Factory building repair and maintenance
Salesmen's salary and commissions
Acid

Depreciation of factory building
Drivers' wages
Legal and accountant fees
Bottle breakage
Stationery and office supplies
Paste
Depreciation of machinery
Water
Heat
Gas, oil, and grease
Freight on goods out
Truck repairs
Freight on empties in
Carbonic gas
Depreciation of cases
Foreman's salary
Office salaries
Extract
Rent of office building
Color
Travel
Sirup
Taxes on plant
Truck licenses
Depreciation of office furniture and fixtures
Advertising
Truck tires
Labels
Insurance on machinery
Light and power
Telephone and telegraph
Machinery repairs
Bond premium on drivers
Factory superintendent's salary
Repair of cases
Truck depreciation
Bottles and cases
Factory clerical salaries

b. Within the manufacturing classification that you have used for part *a*, set up the following control accounts and list the accounts that should appear under each control account:

(1) Materials control.
(2) Payroll control.
(3) Factory overhead control.

c. Indicate a coding system in accordance with the decimal plan for the manufacturing classification given in part *b*.

Problem 6

The following chart of accounts is used by a publisher of college and high-school annuals and yearbooks:

Assets (1–49)
1. Cash in bank—general account
2. Cash in bank—payroll account
5. Petty cash
10. Accounts receivable—customers
11. Employee loans
20. Materials control
21. Work in process—direct materials
22. Work in process—direct labor
23. Work in process—plant overhead
30. Land
31. Real estate improvements
32. Building
33. Machinery and equipment
34. Furniture and fixtures
35. Automobiles
36. Airplane
37. Construction in progress
39. Accumulative depreciation
40. Unexpired insurance
41. Deposits

Liabilities (50–99)
50. Accounts payable
51. Blue Cross
53. Notes payable—banks
54. Notes payable—others
55. Dividends payable
56. Loans—officers
57. Advance payments by customers
60. Mortgage payable
70. Accrued wages
71. Accrued bonuses
72. Accrued and deferred sales commissions
73. Accrued interest
74. Accrued sales tax
75. Accrued F.I.C.A. tax
76. Accrued income tax withheld
77. Accrued unemployment tax—Federal
78. Accrued unemployment tax—State
79. Accrued income taxes
80. Accrued real estate and personal property taxes

90. Capital stock—common
92. Earned surplus
99. Profit and loss
Operating accounts (100–399)
Sales (100–199)
101. Sales—yearbook
102. Sales—other
111. Freight out—yearbook
112. Freight out—other
121. Sales commissions—yearbook
122. Sales commissions—other
Cost of sales (200–299)
201. Cost of sales—yearbooks
202. Cost of sales—other
Operating costs (300–349)
301. Copy dept. control
302. Photo copy dept. control
303. Camera dept. control
304. Negative dept. control
305. Plate dept. control
306. Press dept. control
307. Cover dept. control
308. Silk screening dept. control
309. Bindery dept. control
310. Cutting dept. control
311. Shipping dept. control
312. Rec. & warehouse dept. control
313. Bldg. service dept. control
314. Selling cost control
315. Customer service control
316. Administrative cost control
317. Salaries and wages control
318. Overhead control
Other income (350–359)
351. Purchases discounts
352. Advertising credits
353. Gain from sale of property
359. Miscellaneous
Other deductions (360–369)
361. Interest cost
362. Advance payment discount
363. Loss on sale of property
Income taxes (370–379)
371. Income taxes—Federal
372. Income taxes—state
Dividends (380–389)
381. Dividends
Overhead accounts subsidiary ledger (500–699)
501. Executive salaries
502. Office salaries
503. Sales salaries
504. Customer service salaries
511. General supervision—plant labor
512. Departmental foremen—plant labor
513. Departmental clerks—plant labor
514. Inspection—plant labor
515. Overtime—plant labor
516. Sick leave—plant labor
517. Holiday & vacation—plant labor
518. Training—plant labor
519. Idle time—plant labor
520. Bonuses—plant labor
530. Indirect material
531. Yearbook supplies
532. Light
533. Heat
534. Water
535. Gas
536. Depreciation
540. Taxes—payroll
541. Taxes—real estate and personal property
542. Taxes—other
545. Insurance—life
546. Insurance—comprehensive
547. Insurance and bonds—other
550. Rent (storage)
551. Repairs and maintenance—building
552. Repairs and maintenance—equipment
555. Plant supplies
560. Stationery and office supplies
561. Spoilage—rework
562. Spoilage—other
564. Freight-in
565. Postage
566. Telephone and telegraph
567. Advertising and promotion
568. Travel and entertainment
569. Bad debts
570. Dues and subscriptions
571. Contributions
572. Professional services
573. Operating costs—auto and trucks
574. Employee activities
576. Rental equipment
599. Miscellaneous
611. Apportioned service dept.—shipping
612. Apportioned service dept.—receiving & warehousing
613. Apportioned service dept.—building service
614. Apportioned service dept.—selling
615. Apportioned service dept.—customers' service
616. Apportioned service dept.—administration

a. In reference to the above chart of accounts, comment and criticize the following:
(1) Numbering system used.
(2) Preparation of balance sheets and income statements from the chart.
(3) Relationship of control and subsidiary accounts.
(4) Account titles.

b. What recommendations would you make for changes in the chart so that it would be more useful? (Be specific.)

Problem 7

The Homer Co. has a voucher register with the following columns: Date, Explanation, Terms, Voucher No., Paid (subdivided to show check No. and date), Vouchers Payable, Materials Control, Payroll Control, Factory Overhead Control, and Sundry (subdivided to show account, folio, and Dr. and Cr.). The check register has the following columns: Date, Payee, Voucher No., Check No., Vouchers Payable, Purchase Discount, and Cash in Bank. Use the voucher register and check register to record the following transactions for the month of October. Show totals for all columns.

Oct. 1 Materials purchased from Harvey Co. for $612; terms 2/10, net 30, voucher 1.
2 Received invoice for $98 from Deets Supply Co. for filing cabinet for main office; terms n/30; voucher 2.
10 Paid voucher 1; discount is taken; check No. 343.
12 Received invoice for $146 from Davis Electric Co. for factory repairs; terms n/30; voucher 3.
15 Paid voucher 2; check No. 344.
15 Paid voucher 3; check No. 345.
15 Semimonthly payroll of $3,000 vouchered; tax withheld, $615; voucher 4, drawn to paymaster.
15 Paid voucher 4; check No. 346.
16 Petty cash fund replenished for $100; charged to factory overhead for factory office supplies and postage; voucher 5; drawn to J. Jung, cashier.
20 Materials purchased from Jackson, Inc. $1,575; terms 3/10, net 30; voucher 6.
22 Received invoice for $867 from Rissy Trucking Co. for hauling scrap; terms cash; voucher 7.
25 Received invoice from Allen Printing Co. for $500 for printing stock cards; terms 30 days; voucher 8.
31 Semimonthly payroll vouchered for $3,200; tax withheld, $632; voucher 9 drawn to paymaster.
31 Discovered voucher 5 to be in error and canceled.
31 Paid vouchers 6, 7, 8, and 9; check Nos. 347, 348, 349, and 350.

Problem 8

The Read Manufacturing Co. controls expenditures through the use of the voucher system. The voucher register contains money columns for Vouchers Payable, Materials Control, Factory Payroll Control, Factory Overhead Control, Selling Cost Control, Administrative Cost Control, Factory Equipment Control, and Sundry, Dr. and Cr. The check register contains the following money columns: Vouchers Payable, Purchase Discounts, and First National Bank.

Use the voucher register and check register to record the following transactions for June. Show totals for all columns.

Date	Voucher No.	Check No.	Transaction	Amount	Terms
June 1	601		Purchased materials from Mason & Co.	$2,000	2/10, n/30
4	602		Purchased equipment from Ace Machine Works.	1,950	1/20, n/90
7	603–605		Received advertising services from Baker Advertising Agency.	300	$100 on June 7, 14, and 21
		1	Paid voucher 603, June 7 installment.	100	
8	606		Purchased factory supplies from Beth Co. (Materials Control).	320	1/30, n/60
10	607		Salesmen's travel vouchered (Robert Brown).	425	
13		2	Paid voucher 601 too late to take discount.	$2,000	
14		3	Paid voucher 604.		
15	608	4	Paid first half of June payroll: factory payroll, $5,400; selling salaries, $2,000; administration salaries, $2,035; tax withholdings: $2,000.		
20	609	5	Paid $350 on equipment purchased June 4, and issued 6% 6-month note for the balance, full discount taken on $1,950.		
	610	6	Paid yearly insurance premium on machinery and equipment to Mutual Insurance Co.	300	
21		7	Paid voucher 605.		
24			Returned $20 of factory supplies purchased on June 8 (voucher 606).		
30	611	8	Paid note issued on June 20 and interest on note.		
30.	612	9	Paid second half of June salaries: factory payroll, $5,450; selling salaries, $2,050, administration salaries, $2,000; tax withholdings, $1,800.		
	613	10	Paid rent to Schafer Real Estate Co. Factory overhead, $2,000; administrative cost, $1,750; selling cost, $250.		
		11	Paid voucher 606.		
	614		Voucher 607 is canceled and a new voucher is prepared for $400 due to error in totaling statement.		
		12	Paid voucher 614.		

Problem 9

The Schulte Processing Co. uses a voucher register and a check register as records of original entry for all disbursements. The voucher register contains the following money columns: Vouchers Payable, Materials Control, Payroll Control, Factory Overhead Control, Selling Cost Control, Administrative Cost Control, Equipment Control, and Sundry, Dr. and Cr. The check register contains money columns for Vouchers Payable, Purchase Discount, and Cash in Bank.

Record the transactions for October in the proper records of original entry; total and rule each register.

Date	Voucher No.	Check No.	Transaction
Oct. 1	1	1	Building rent of $350 is vouchered and paid to Traylor Agency. It is divided as follows: administration, $60; selling, $20; and manufacturing, $270.
	2		A new lathe was purchased from the Scott Machine Co.; terms, 2/15, n/60, $4,000.
2	3		An invoice, covering purchase of raw materials in the amount of $1,200 from the Rector Co., terms 1/15, n/30, is received and vouchered.
3	4	2	A $50 freight bill for the new lathe, voucher 2, is vouchered and paid to the N.Y.C. R.R.
4	5		A voucher is prepared and entered in favor of the Owens Co. for $60 for supplies which are to be kept in the stockroom until needed.
7	6	3	A voucher is prepared and a check is issued in favor of the postmaster for the purchase of $15 in stamps, which are treated as administrative cost.
12	7		Purchase of gasoline and oil from the Starr Co., $50, treated as selling cost.
15	8	4	Semimonthly payroll of $2,000 is vouchered and paid; tax withholdings, $250.
16	9		Advertising bill of $500 for October from Green Advertising Co. is vouchered.
	10		Insurance premium of $600 in favor of Calvin Insurance Co. for the year is vouchered.
		5	Voucher 2 is paid and discount is taken.
17	11	6	Property taxes for the year, amounting to $1,200, are vouchered and paid to the county treasurer; accruals for taxes have been made monthly.
		7	Voucher 3 is paid and discount is taken.
20	12		Purchase of materials, $2,500, from the Reno Co., terms, 1/10, n/60.
22	13	8	A voucher is prepared and a check issued for $100 to Henry Moore, a salesman, as an advance on his Oct. 31 salary.
25	14	9	Freight bill for shipment covered by voucher 12 is vouchered and paid in the amount of $80 to the N.Y.C. R.R.
28		10	Materials, included in the purchase from the Reno Co., voucher 12, amounting to $100 are returned as unsatisfactory; a check is issued in settlement of the account.
29	15–18	11	Machinery is purchased from the American Equipment Co., contract price $4,000, terms $1,000 cash and three monthly installments of $1,000 each. Four vouchers are prepared, and a check is issued for the down payment.

Date	Voucher No.	Check No.	Transaction
31	19	12	Semimonthly payroll of $2,200 is vouchered and paid; tax withholdings: $275.
	20	13	Power and light bill, $170, is vouchered and paid; distribution: factory overhead, $80; selling costs, $30; administration costs, $60.
		14	A check is issued in payment of voucher 5.
	21		Voucher 9 is canceled and a new voucher is prepared for $400, the correct amount owed to the Green Advertising Co.
		15	Voucher 21 is paid.

CHAPTER III

Questions

1. Why is the proper control of materials and supplies such an important part of systems of cost accounting?

2. Enumerate the important requirements of every system of material control.

3. What functions of material control are the responsibility of each of the following departments or divisions: the budget committee, the purchasing department, the receiving department, the testing department, stockrooms, production departments, the financial division, and the administrative division?

4. Describe in detail the activities of the purchasing department of a manufacturing establishment.

5. What forms of statistical and accounting records are maintained in the purchasing department?

6. What is the purpose of the purchase requisition? What type of information does it contain? What disposal is made of each copy?

7. What purposes does the purchase order serve? Why is it an important part of the system of material control? What information does it contain?

8. Explain alternative methods of checking and recording materials and supplies by the receiving department. Describe the materials received report. How does it differ from the testing report?

9. Describe the procedure of checking invoices and the preparation of vouchers for purchases of materials and supplies. What business papers are customarily attached to vouchers?

10. *In cases of errors in invoices, incorrect quantities of materials received, inferior* materials, or damaged shipments, what adjustments are made by the purchasing department?

11. In what books of original entry are purchases of materials and supplies recorded?

12. What entry is made in the check register when a voucher for material purchases is paid? What disposition is made of the paid voucher?

13. What plan of organization and arrangement of materials and supplies would you recommend for stockroom control for a manufacturer of office furniture and equipment?

14. What are the important functions performed by stockroom divisions? Discuss each briefly.

15. Explain what is meant by a perpetual inventory system of controlling materials and supplies. What are the advantages attributed to such a system?

16. Describe the accounting records required in the maintenance of a system of perpetual inventories.

17. What are material requisitions? Why are they an important part of a system of material control? What forms of requisitions are used in manufacturing concerns for handling large quantities of materials required by production departments? How are small items such as bolts, screws, ink, and various types of chemicals requisitioned?

18. What general ledger accounting entries are necessary to record the purchase of materials and supplies? To record the issue of materials and supplies from stockrooms? What columns would be included in a Materials and Supplies Requisition Journal?

19. What general ledger and subsidiary record entries are required for each of the following business transactions (assume that the journals of original entry consist of a voucher register, a check register, and a general journal):

a. Purchase of raw materials at a total cost of $1,000 is vouchered, and a check is issued; the materials are received and checked into the stockroom?

b. Materials costing $100 are returned from the stockroom to the supplier for credit?

c. A requisition for materials costing $200 is filled by the stockkeeper for production Dept. A?

d. Material valued at $20 is returned by production Dept. A to the stockroom for credit?

Problem 1

In a large concern the payment of purchase invoices is ostensibly under close control. The invoices pass through the usual routine of verification by the purchase, receiving, and accounting divisions. They accompany the checks when presented to responsible officers for signature and countersignature, and all invoices and memoranda pertaining to a payment are filed together. Nevertheless, it occasionally happens that an invoice is paid twice. Describe various conditions under which this could take place and how they may be remedied.

(Uniform Certified Public Accountant Examination, May, 1939)

Problem 2

The quantities in inventory in the McNulton Manufacturing Co. have been increasing for many months. The cost accounting department has been asked to assist in reducing and controlling the inventory. A study reveals the following facts:

1. Materials received for jobs that have been canceled or for which specifications have been changed are not used on new jobs.
2. Vendors have shipped materials in excess of purchase orders.
3. Production departments have placed orders for materials of odd sizes which are not carried regularly in stock.
4. Materials have been ordered for immediate shipment when actual processing time is several weeks after receipt.
5. Materials have been ordered for entire quantity of customers' orders when deliveries of finished products are to be spread over a period of months.
6. Materials have been purchased in advance of prospective orders from customers reported by the optomistic sales manager.
7. An overoptimistic viewpoint has existed in the sales department regarding sales of replacement parts from stock.

Outline a plan for the control of ordering and purchasing of materials which will prevent overstocking of inventories.

Problem 3

An executive of the McNish Manufacturing Co. visited the storerooms and found that the materials were carefully stored, properly identified, and the items neatly recorded. He selected at random a few items of material, jotted down the quantity of each as shown on the stock ledger cards, and found that the physical count agreed with the respective book balances of the items selected for the test. The value of the materials in the Materials Control account amounted to $144,000. In the production department he learned that the average monthly consumption of the materials was about $3,600. In the purchasing department he learned that the materials could be obtained in quantities desired within a period of 2 to 3 weeks.

Do you think that this executive should have been satisfied that his company had adequate inventory control? Explain, giving evidence for your decision.

CHAPTER IV

Questions

1. Why is the determination of the cost of incoming materials a difficult and an important accounting problem? What elements of cost should be included in the valuation of materials received?

2. What alternative methods can be used in recording and controlling purchase discounts?

3. If a Purchase Discount account is used, what entries would be made to this account? What entries would be made in a Purchase Discount Lost account?

4. How should purchase discounts lost be treated when the books are closed and financial statements are prepared?

5. Explain the accounting treatment for the application of material purchasing and handling rates to the cost of goods received. How are the actual purchasing and handling costs recorded? What disposition should be made of the variance between actual and applied purchasing and handling costs?

6. Why is there an important problem involved in determining the proper pricing of materials and supplies issued from stockrooms on requisition? What are the alternative methods of pricing issued materials?

7. Explain the principles underlying the first-in, first-out method of pricing materials. What are the advantages and disadvantages attributed to the method? Is it commonly used and generally accepted?

8. What is the average method of pricing materials issued? Explain how it is used and its advantages and disadvantages.

9. Explain the principles upon which the last-in, first-out method of pricing issued materials is based.

10. What is the standard price method of pricing materials issued? Is it a commonly used method? Why is it gaining in popularity?

11. During rapid increases in market prices of materials used in production, which method of pricing results in the most accurate costing of goods manufactured and sold? during periods of rapidly decreasing market prices? How would your answer differ if there is not a corresponding change in the selling price of the finished products sold?

12. What accounting procedure is required for materials returned from stockrooms to vendors or suppliers? What pricing problem is involved?

13. What method should be used for pricing materials returned from production or service departments to stockrooms?

14. Why is a periodic physical inventory of materials and supplies necessary when there is a system of perpetual inventory records in use?

15. Explain what procedures are followed and the forms that may be used in taking a physical inventory of a department store. How would the procedure differ for a manufacturing concern?

16. When shortages in quantities of materials are disclosed by the physical count as contrasted with the perpetual inventory records, what general ledger and subsidiary record entries should be made, assuming that each of the following conditions caused the shortages:

a. Theft of materials by unknown parties.

b. Shrinkage in quantity due to evaporation considered to be a normal condition of business operations.

c. Loss due to flood damage.

Problem 1

You have a client who wishes to include as a part of the cost of raw material in stores all of the cost of acquiring and handling incoming material. You are asked to:

a. Name the principal items which may enter into the cost of material acquisition and handling.

b. Give the arguments favoring the inclusion of these items as a part of the cost of raw material in stores.

c. Give the arguments against the inclusion of these items as a part of the cost of raw material in stores.

(Uniform Certified Public Accountant Examination, November, 1949)

Problem 2

The Wessex Co. plans to value its materials at invoice cost, less cash discount, plus receiving and handling costs.

The material receiving and handling costs for the month of October are estimated to be $1,800. The purchasing budget for the same period shows estimated purchases of 1,500 units of material for $12,500.

a. Compute two applied material receiving and handling rates. Show the formulas.

b. Use the rates computed in *a* to prepare two alternative entries in general journal form for the following transaction:

Oct. 18 Received 30 units of material; invoice cost, $360; terms, 2/10, n/60.

c. Explain two ways that the variance between actual and applied receiving and handling costs may be disposed of at the end of the accounting period.

Problem 3

The estimated receiving and handling charges in the budget for the Coulter Co. were $2,000.

The estimated net cost of materials for the budget period was $25,000.

The actual receiving and handling costs amounted to $2,025.

The actual materials purchased totaled $23,508.

a. What was the amount of the variance between the actual and applied material receiving and handling costs?

b. Were the actual receiving and handling costs under- or overabsorbed? What disposition would you recommend for the variance?

Problem 4

The Toledo Manufacturing Co. values its materials at invoice cost, less cash discounts, plus applied receiving and handling costs.

The following cost accounts and other data are available:

Accounts	Estimated costs per budget at beginning of period	Actual costs for budget period
Cartage-in	$ 190	$ 200
Freight-in	700	500
Purchasing dept. costs	1,000	1,025
Receiving dept. costs	500	675
Storage and stockroom costs	460	550
Testing dept. costs (for materials purchased)	150	160
	$3,000	$3,110

The purchasing budget shows estimated net purchases for the period of $25,000.

During the budget period the following shipments of materials were received:

Jan. 10, 75 units of material purchased for a net invoice cost of $7,500.

Jan. 20, 200 units of material purchased for a net invoice cost of $17,000.

a. Assuming that a single applied receiving and handling rate is to be used during the period, compute the rate.

b. What is the total amount of applied receiving and handling costs added to purchases of materials during January?

c. What is the total amount of variance between the actual and applied receiving and handling costs?

d. Have the actual receiving and handling costs been under- or overabsorbed? What disposition would you recommend for the variance?

Problem 5

The Adrian Metal Products Co. values its purchases at cost. Cost includes invoice price less cash discounts plus all receiving and handling costs.

The company's budget for the first quarter of the year contains the following estimates:

Net purchases	$75,000
Purchasing costs	2,000
Storage	650
Testing	300
Receiving	2,400
Freight-in	1,400

The following shipments were received during the month of January:

Jan. 1, purchase A, $5,000; terms 30 days.
Jan. 13, purchase B, $10,000; terms 2/10, n/30.
Jan. 21, purchase C, $7,500; terms 1/10, n/30.

Actual costs for January were purchasing, $600; storage, $250; testing, $100; receiving, $700; freight-in, $500.

a. Compute an applied material receiving and handling rate for the first quarter of the year.

b. Record the purchases and actual handling cost in general journal form.

c. Compute the variance between the actual and applied receiving and handling costs and explain what disposition you would recommend for the variance.

Problem 6

The Bethany Publishing Co. had an opportunity to purchase 20 carloads of book paper at a substantial discount. The traffic department reported that sufficient warehousing would not be available on the arrival date and that approximately 10 days of demurrage would have to be paid to the Santa Fe Railroad for the use of the boxcars. The savings from taking the discount were more than the demurrage charge, and it was decided to take advantage of opportune buying. The head of the receiving department sent a memorandum to the cost accounting department stating that he did not want the demurrage charge included in the cost of operating his department, and he suggested that the added cost be charged to the purchasing department. If you were the chief cost accountant, what disposition would you make of the demurrage charge?

Problem 7

It has been stated that cost for inventory purposes may be determined under any one of several assumptions as to the flow of cost (such as "first-in, first-out," "average" and "last-in, first-out"). The major objective in selecting a method should be to choose the one which under the circumstances, most clearly reflects periodic income.

a. For what reasons do accountants make assumptions as to the flow of cost instead of actually identifying the cost of the specific items which are sold?

b. In any given case, on what would you base your decision as to which of the three assumptions as to the flow of cost stated above most clearly reflects periodic income?

c. Would application of the above directive always result in the clearest presentation of current financial position? Explain.

(Uniform Certified Public Accountant Examination, November, 1950)

Problem 8

The Howell Manufacturing Co. had an opening inventory on Jan. 1 of 100 units (stock No. 201, bronze castings) priced at $5 per unit. During the year purchases of 200 units were made as follows:

February	20	@ $6
May	40	@ 7
August	60	@ 8
November	80	@ 9
Total	200	

Closing inventory at end of the year totaled 150 units.

Required:

a. Valuation of ending inventory, last-in, first-out method.
b. Valuation of ending inventory, first-in, first-out method.
c. Valuation of ending inventory, average method.

Problem 9

The Carr Production Co. received and issued the following amounts of material X as typical of the 10,000 items in inventory.

Opening inventory, 12,000 units priced at $2.00 per unit.

	Purchased (units)	Issued (units)
1st quarter	20,000 @ $2.20	16,000
2d quarter	30,000 @ 2.40	26,000
3d quarter	25,000 @ 2.30	32,000
4th quarter	10,000 @ 2.25	8,000

All purchases were made the first day of the quarter.

a. What is the value of the material issued during the year and the ending inventory for each of the following methods of determining cost by the perpetual inventory method (set up stock ledger sheet and show your computations):

(1) Average?
(2) First-in, first-out?
(3) Last-in, first-out?

b. What is the value of the ending inventory for each of the methods in *a* when the periodic inventory method is employed?

Problem 10

Assume that purchases and issues of material for the Clary Co. have been made in the following order and amounts:

	Units	Unit cost
First purchase	100	$1.00
Second purchase	200	1.10
First issue	175	
Third purchase	250	1.20
Second issue	275	
Fourth purchase	100	1.25
Third issue	50	

a. What is the value of the ending inventory under the following methods of determining cost when a perpetual inventory system is employed (show your computations):

(1) Average?
(2) First-in, first-out?
(3) Last-in, first-out?

b. What are the advantages and disadvantages attributed to the last-in, first-out method?

c. Determine the ending inventory value for each of the methods given in *a* when a periodic inventory plan is used.

Problem 11

Set up a stock ledger sheet for material with the following columns:

Date	Received:	Issued:	Balance:
	Quantity	Quantity	Quantity
	Unit cost	Unit cost	Unit cost
	Total cost	Total cost	Total cost

Record the following transactions, pricing the material issued by the first-in, first-out method. Show the balance after each transaction and the total value of the materials issued during the period.

Jan. 1 Balance, 300 units @ $1.00 per unit.
7 Issued 45 units.
17 Received 200 units @ $1.09 per unit.
27 Issued 165 units.

Problem 12

Construct a stock ledger sheet in accordance with the form required for Prob. 11; enter the same transactions, using the average cost method of pricing materials issued. Show the balance after each transaction and the total value of the materials issued during the period.

Problem 13

Construct a stock ledger sheet in accordance with the form required for Prob. 11; enter the same transactions, using the last-in, first-out method of pricing materials issued. Show the balance after each transaction and the total value of the materials issued during the period.

Problem 14

Set up a stock ledger sheet for material with the following columns:

Ordered:
  Date
  Purchase order No.
  Quantity
  Date expected

Received:
  Date
  Purchase order No.
  Quantity
  Unit cost
  Total cost

Issued:
  Date
  Requisition No.
  Department or production order No.
  Quantity
  Unit cost
  Total cost

Balance:
  Quantity
  Unit cost
  Total cost

Record the following transactions, pricing the material issued by the first-in, first-out method. Show the balance after each transaction and the inventory value on Sept. 30. The books are closed quarterly.

July 1 Balance, 1,000 units @ $1.00 per unit.
15 Ordered 500 units, purchase order 900; expected July 20.
18 Issued 250 units, requisition 400 to Dept. X.
21 Received 300 units, purchase order 900, @ $1.04 per unit.
25 Ordered 500 units, purchase order 950, expected Aug. 5.
Aug. 1 Issued 350 units, requisition 501 to Dept. Y.
10 Received 400 units, purchase order 950, @ $1.10 per unit.
20 It was discovered that 10 units received on July 21, purchase order 900, were defective. They were returned to the vendor for credit at the invoice price.
Sept. 1 Received 200 units, the balance of purchase order 900, @ $1.04 per unit.
15 Issued 200 units, requisition 908, to Dept. Z.
20 Dept. Z returned to stockroom for credit 50 units that had been issued on requisition 908 on Sept. 15.
30 Issued 250 units, requisition 1206 to Dept. X.

The company follows the first-in, first out policy of valuing units returned to the vendor.

Problem 15

Construct a stock ledger sheet in accordance with the form required for Prob. 14; enter the same transactions, using the average cost method of pricing materials issued. Show the balance after each transaction and the inventory value on Sept. 30. The company follows the policy of valuing units returned to the vendor at the latest average cost per unit.

Problem 16

Construct a stock ledger sheet in accordance with the form required for Prob. 14, enter the same transactions in accordance with the last-in, first-out method of pricing materials issued. Show the balance after each transaction and the inventory value on Sept. 30. The company follows the last-in, first-out policy of valuing units returned to the vendor.

Problem 17

In computing costs, the owner of filling station A assumed that he was always pumping off the bottom of his tank (fifo). The owner of filling station B assumed that he was always pumping off the top of his tank (lifo). On Apr. 30, both had the same inventory totaling 6,000 gal. which cost $0.20 per gal. In May, each owner bought an additional 6,000 gal. at $0.25 per gal. Sales during May, for each station, totaled 8,000 gal. at $0.30 per gal. Determine for each station the net profit for the period and the ending inventory value.

Problem 18

The Anderson Oil Co. is a bulk distributor of fuel oil. A periodic inventory of fuel oil on hand is taken when the books are closed at the end of each month.

The following summary of information is available for the month of January:

Sales	$31,500
General administrative costs	3,000
Inventory, Jan. 1, 100,000 gal. @ $0.09	9,000
Purchases (including freight-in):	
Jan. 2 300,000 gal. @ $0.10	30,000
Jan. 10 200,000 gal. @ 0.12	24,000
Inventory Jan. 31, 390,000 gal.	

Compute the following data by the first-in, first-out, average, and last-in, first-out method of inventory costing:

a. Value of the inventory on Jan. 31.
b. Amount of the cost of goods sold for January.
c. Profit or loss for January.

Problem 19

When a physical inventory of raw materials was taken by the inventory staff of the Ottawa Manufacturing Co. on Dec. 31, 19—, the following differences between the stockroom records and the actual quantities on hand were recorded in an inventory adjustment sheet:

1. Material A—actual quantity 1,250 units; stock ledger card balance, 1,300 units; average cost per unit, 30¢; cause of shortage is attributed to carelessness in the inventory count. It is too late to recheck the inventory.
2. Material B—actual quantity 600 units; stock ledger card balance 350 units; average cost per unit, $5; part of the excess quantity is discovered to have been caused because purchase order 1809 for 150 units, costing $5 per unit, has not been recorded either in the stock ledger or in the general ledger. The balance of the excess is due to errors in issuing units from stock.
3. Material C—actual quantity 8,000 gal.; stock ledger card balance, 8,200 gal.; average cost per gallon, 70¢. The shrinkage is a normal condition of storage and material issue.
4. Material D—actual quantity, 150 units; stock ledger card balance, 250 units; average cost per box, $10. The shortage is attributed to theft.
5. Material E—actual quantity, 1,000 units; stock ledger card balance, 1,000 units; average cost per unit, $5; the material is obsolete and the total quantity is sold as scrap for $750.
6. Material F—10 units are not in accordance with purchase specifications and are to be returned to the vendor for credit. The original invoice cost was $1.50 per unit, but express charge of $2.00 was added in the stock ledger account. The current stock ledger price for material F is $1.80 per unit.

Required:

a. Journal and subsidiary stock record entries for each of the cases of material differences as of Dec. 31.

b. A statement of policy to be followed in adjusting differences between physical and book inventories at the end of each accounting period, giving the underlying accounting principles and entries involved.

CHAPTER V

Questions

1. Why is the proper control of labor costs of importance to the cost accountant? What departments are responsible for controlling labor costs and maintaining personnel records? What functions are performed by each department?

2. What important functions are the responsibility of the personnel department? What types of personnel records should be prepared and maintained by this department?

3. What are the functions performed by the rate department? How are time and motion studies made of labor and plant operations?

4. What are the important duties performed by the timekeeping department? Describe two different plans of recording employee time in and out of a factory or office?

5. What methods may be used to record the time of employees by departments, by operations, and by jobs? What types of time and labor cost records can be used?

6. Exclusive of timekeeping, what are the functions performed by the payroll department? How do its duties differ in a retail department store compared with a manufacturing concern?

7. What functions does the cost accounting department perform in controlling and accounting for labor costs?

8. Why is a knowledge of wage-payment plans of value to the cost accountant? What are the major forms of wage-payment plans in use in manufacturing concerns?

9. Discuss the straight-time wage plan showing its importance, its applicability, and its advantages and disadvantages.

10. What are piece-rates? How are they computed and applied to various types of work? What advantages and disadvantages are attributed to their use? What principles should govern the determination and revision of piece-rates?

CHAPTER VI

Questions

1. Describe briefly the main provision of the Federal Social Security Act. What are the principal objectives of the act?

2. What are the important provisions of the Federal Insurance Contributions Act?

3. Give a brief answer to each of the following questions in regard to the Federal Insurance Contributions Act:

a. What employers are subject to the provisions of the act?
b. What employees are *not* insured under the act?
c. What provisions are made for self-employed persons to be insured under the act?
d. What are the present tax rates for employees and employers? for self-employed?
e. Are taxes computed on the "cash basis" or "accrual basis"?
f. How does each employee obtain a social security card with an account number?

4. What type of tax return must employers file for the Federal Insurance Contributions Act taxes? When is it due? With what agency must it be filed?

5. Describe the important taxing provisions of the Federal unemployment law. What objective was expected to be accomplished by this section of the Social Security Act? Has that objective been accomplished?

6. In connection with the Federal unemployment law, explain the meaning of each of the following terms: wages, employment, employers, and employees.

7. Why are there state unemployment compensation laws in addition to the Federal unemployment provisions of the Federal Social Security Act? Are the state laws uniform in their coverage and tax rates? Explain.

8. Explain what is meant by the merit-rating provisions of the unemployment laws of various states. Of what interest are they to managers and accountants of business enterprises?

9. Is an employer considered taxable if during 20 weeks in a calendar year he

a. Employs one shift of four workers during the day and another shift of four at night?

b. Has six regular employees each week and hires two extra employees on Saturday?

c. Hires 10 workers, all over eighteen, one day each week to distribute handbills?

10. A jewelry manufacturer employs eight steady workers, two of whom are his sons, eighteen and twenty years of age, respectively. Is the employer subject to the Federal unemployment tax?

11. A manufacturer of Christmas specialties employed 20 men from Oct. 1 to Dec. 20; he employed 6 men from Jan. 1 to Oct. 1. Is he subject to the Federal unemployment tax?

12. When is the Federal unemployment tax return due?

13. What is the percentage rate which most employers *actually pay* for Federal unemployment tax purposes?

14. Everett Jamison worked during the year as a commodity salesman from Jan. 1 to July 31 for employer A, during which time he earned $2,800 in salary; in addition, he was paid $300, his actual expenses for traveling during the period. From Sept. 1 to Dec. 31 he worked for employer B as an insurance agent on a straight commission basis, during which time he earned $800.

a. Compute the total amount of *both* employers' F.I.C.A. taxes on Jamison's salary.

b. Compute the net total amount of both employers' Federal unemployment taxes on Jamison's salary, assuming that the state credit was 90% of the Federal tax.

15. What is the Federal government's purpose in requiring the withholding of income taxes from employees' wages?

16. Are the same classes of employees subject to the old-age tax and the Federal income tax withholding?

17. List the classes of employees who are exempt from the Federal income tax withholding.

18. Explain how withholdings are determined for each employee.

19. What accounting entries are required of the employer for the withholding and payment of the income tax computed on employees' wages?

20. What are the requirements of employers for depositing and reporting of Federal Insurance Contribution Act taxes and income taxes withheld?

21. Explain what accounting entries are required of employers for the withholding and payment of each of the following: union fees and dues, savings and bond purchases, health and welfare dues, and charitable contributions.

22. What are the main provisions of the Federal Fair Labor Standards Act?

23. What should be the important objectives of payroll records and payroll accounting?

24. What payroll accounts are commonly used in recording payroll elements? What types of subsidiary records do such general ledger accounts control?

25. What entry is made to record the payroll summary of a manufacturing concern? What entry is made when the payroll is disbursed by checks?

26. What payroll and personnel records are necessary to meet the requirements of the social security program, the Federal income tax withholding requirements, and other payroll deductions such as union dues and employee bond purchases? Describe each record.

27. What accounts are required to record employer's payroll taxes?

28. What liability accounts would you recommend for use by the accountant to provide for deductions from employees' wages and to recognize the employer's taxes and dues?

29. In general, how should payroll taxes be distributed to cost units such as departments, jobs, processes, and sales territories?

Problem 1

During the year the Dickey Co. paid John Capper, a plant supervisor, a total salary of $4,735 plus reimbursement of $436 for travel.

a. Compute the F.I.C.A. tax that was withheld from Capper's earnings by the Dickey Co.

b. Compute the F.I.C.A. tax levied against the Dickey Co. on the salary paid to Capper.

c. Assuming that the Dickey Co. is subject to the Federal and state unemployment taxes and that the company has a state merit rating of 1.5%, determine the Federal and state unemployment tax that would be levied against the Dickey Co. on the salary paid to Capper.

Problem 2

During the year the Miller Chair Co. paid wages to its employees as follows:

Hall, $4,200; Prothe, $2,600; Brownback, $3,000; Morton, $5,100; Anderson, $3,600; Knott, $3,000; Roth, $2,900; Winn, $4,000; Gleason, $3,450.

a. How much of this total annual payroll is exempt from the F.I.C.A. tax?

b. How much of this total annual payroll is exempt from the F.U.T. and S.U.T.?

Problem 3

The Overtown Manufacturing Co. closes its books on June 30 and Dec. 31.

For 6 months ended June 30, it had a payroll of $11,400, all of which was subject to Federal and state payroll taxes. Salaries and wages during each month had been $1,900, and there had been no accrued payrolls at the end of each month. Federal income tax withheld from employees amounted to $280 each month.

a. What was the amount of cash paid each month to employees?

b. What was the total amount of F.I.C.A. tax on the corporation for the 6-month period?

c. During the month of April, what should have been the total amount of the remittance to the Federal government for taxes?

d. What should be the balance of the Accrued Employer's F.I.C.A. Tax account on June 30?

Problem 4

The Stockton Produce Co. has the following payroll data regarding employees during the year ended Dec. 31:

Name	Classification	Total compensation
Coolidge..........	Foreman	$3,600
Dittmer...........	Truck driver	3,000
Erickson..........	Stenographer	2,500
Johnson...........	Salesman	4,000
Koch.............	Truck driver and buyer	4,200

In addition to the above individuals, two painters were employed for 10 days each and two carpenters for 21 days each (at the rate of $16 a day for painters and $20 a day for carpenters) to paint and remodel the warehouse. Each Saturday during the year a high-school boy is employed at the rate of $2 per day to help in the office.

a. What is the amount of the total taxable wages for the year?
b. What is the amount of the company's F.I.C.A. tax for the year?

Problem 5

The Samson Co. is subject to the taxes imposed under the Federal and state unemployment tax acts and the Federal Insurance Contribution Act and to the withholding provisions of the Federal income tax. The total wages for March, all taxable, were $10,000. Federal income tax withheld was $2,000. The company does not have a merit rating.

a. Show in journal form the entry to voucher the March payroll.
b. Show in journal form the entry to record the company's payroll taxes.

Problem 6

The payroll for the Supreme Co. for the week ending Mar. 31 is as follows:

Name	Total weekly earnings	Federal income tax withheld
Lester Toman	$210	$28
Mary Smith	60	10
Jerry Light	55	6
Les Kelley	40	1
H. R. Adams	57	6
Henry Johns	82	4
Allen Alans	73	5
James Johnson	37	7
Larry Winters	46	0

Smith, Kelley, and Johns have each authorized the company to make a $5 weekly payroll deduction for the purchase of U.S. Savings Bonds. The company has a merit rating of 1.2%. Individual earnings through Mar. 31 have been less than $3,000.

a. Give the journal entry to voucher the weekly payroll and to recognize all payroll deductions.
b. Give the journal entry to record the employer's payroll taxes.
c. When are the taxes that you have accrued in parts *a* and *b* payable and to whom?

Problem 7

The Meier Co. closes its books on Dec. 31. During the calendar year it had a total payroll of $20,400, represented by $5,100 each quarter. Included in this amount was $2,300 F.I.C.A. and $2,600 F.U.T. and S.U.T. taxable payroll for the last quarter of the taxable year. The total payroll for the first three quarters was subject to all payroll taxes.

The employer's and employee's F.I.C.A. taxes were paid during the month following each quarter; the S.U.T. was paid during the month following each quarter; the F.U.T. is to be paid during January following the calendar year; and the Federal income tax withheld, which totaled $80 each month, was properly paid during the month following each quarter.

Compute the balances that should be found in each of the following accounts on the company's books as of Dec. 31 before the books were closed, indicating in each case whether the balance of the account is a debit or a credit:

a. F.I.C.A. Tax Expense.
b. F.U.T. Expense.
c. S.U.T. Expense.
d. Employees' Withholdings for F.I.C.A. tax.
e. Accrued Employers' F.I.C.A. tax.
f. Accrued F.U.T.
g. Accrued S.U.T.
h. Employees' Withholdings for Federal Income Tax.

Problem 8

The Rader Co. has the following payroll summary for the week ended Dec. 7:

Factory payroll	$12,000
Administrative salaries	4,500
Selling salaries	1,750

An analysis of the payroll records reveals that the factory payroll comprises $10,000 for direct labor and $2,000 for indirect labor. No worker in the factory is exempt from F.I.C.A. taxes. Included in the administrative salaries is $500 for the general manager, who is exempt from payroll taxes at this date. Federal income tax withheld amounts to $2,000. The selling salaries are for the company's one salesman, whose total remuneration is computed as follows:

Salary for week	$ 55
Travel and entertainment for the month of November	500
Commissions on orders received during preceding year but not shipped until current year	1,195
Total	$1,750

For the period Jan. 1 to Nov. 30, the salesman received the following payments from the Rader Co.:

Salary	$2,640.00
Travel	3,170.00
Total	5,810.00

The Rader Co. has a merit rate of 1.5% for the state unemployment tax.

Prepare entries in general journal form to voucher the payroll for the week ended Dec. 7 and to recognize the employer's payroll taxes. Show computations.

Problem 9

The Kollas Co. has a state unemployment tax rate of 1.7% under the merit-rating plan. On Mar. 15, the company received a notice from the state, explaining that if the company made a lump sum payment of $32,000 the state unemployment tax rate would be reduced to 0.7% retroactive to Jan. 1. Taxable wages paid during January had been $400,000; during February, $390,000; and from Mar. 1 to Mar. 15, $210,000. After a conference with the executive of the business, the budget director estimates that wages for the rest of the year would be $190,000 for the last 15 days of March and would be $400,000 each of the remaining months of the year.

a. What saving or loss would the company receive by accepting the offer of the state?

b. Assuming that the company accepts the offer and makes the payment on Mar. 16, prepare a journal entry to record the payment (the voucher system is used).

c. Prepare all adjusting entries that should be made to adjust the accounts which are affected.

d. An extended strike kept the plant idle for 5 months during the year; subsequent production lagged so that the actual taxable payroll for the year amounted to $2,200,000. What was the net gain or loss to the company insofar as the state unemployment tax is concerned?

Problem 10

The following payroll data is taken from the records of the Kramer Corporation. The company has a 2% merit rating.

Employee, No.	Wages paid				
	Three quarters ending Sept. 30	October	November	December	Total
1	$ 2,700	$ 300	$ 300	$ 300	$ 3,600
2	1,650	250	250	250	2,400
3	2,400	300	200	300	3,200
4	2,700	200	300	200	3,400
5	3,200	400	300	400	4,300
6	1,850	300	300	350	2,800
7	2,600	300	0	100	3,000
8	2,300	300	300	300	3,200
Total..........	$19,400	$2,350	$1,950	$2,200	$25,900

Assume that the total Federal income tax withholdings each month were 20% of payrolls.

Required:

a. Journal entries to record the payment of the payroll for the month of December.

b. Journal entry to record the employer's taxes on the December payroll.

c. Journal entries to record the remittances sent to the Federal and state governments after the close of the last quarter.

Problem 11

The Crane Tool Co. is subject to the provisions of the Federal Fair Labor Standards Act. Overtime is paid only as required by the law.

1. Employee Nickoll's regular hourly rate is $1.00. He works 45 hr. during 1 week.

a. What are his regular earnings?

b. What are his overtime earnings?

2. Employee Smyth's wages are $58.50 a week for a regular work week of 39 hours (7 hr. a day for 5 days, and 4 hr. on Saturday). He works 45 hr. during 1 week.

a. What is his regular hourly rate?

b. What are his regular earnings?

c. What are his overtime earnings?

3. Employee Bigelow accepts a job with the understanding that he is to work 7 hr. per day during each of the 6 days of his work week, and he is to receive a weekly wage of $86. He works 50 hr. in 1 work week.

a. What is his regular hourly rate?

b. What is the amount of his regular earnings?

c. What is the amount of his overtime earnings?

4. Employee Hanna is paid $40 a week for work in a department where no regular schedule of hours is maintained during the week. He works 50 hr. during one week.

a. What is his regular hourly rate for the week?

b. What is the amount of his regular earnings?

c. What is the amount of his overtime earnings for the week?

5. Employee Williams is paid 10¢ for each unit he completes. During one week he completed 360 units while working 45 hr.

a. What is his regular hourly rate for the week?

b. What is the amount of his regular earnings?

c. What is the amount of his overtime earnings?

Problem 12

The Metal Builder's Co., a partnership, manufactures and installs sheet metal for air conditioning and other types of building installations. The following payroll data is taken from records for the week ended Oct. 31:

Employee No.	Name	Job title	Wages paid during year to Oct. 24	Wage basis	Rate of pay	Hours worked	Income tax withheld
5	Anderson	General manager	$8,000	Weekly salary	$200	40	$34
7	Miller	Clerk	2,050	Weekly salary	$ 50	40	2
8	Prothe	Accountant	4,250	Weekly salary	$100	44	8
32	Knott	Shop foreman	3,550	40-hr. week	$ 75	42	11
15	Meier	Tinner	3,400	40-hr. week	$ 60	40	12
22	Kaiser	Tinner	2,970	40-hr. week	$ 55	40	6
23	Eubank	Tinner	2,800	40-hr. week	$ 50	40	0
31	Winn	Handyman	1,800	Hourly	$1 00	45	2

The Wage basis column represents the method of payment agreed upon by the employer and the employee. Since the company is covered by the Federal Fair Labor Standards Act, all employees except Anderson must be paid an overtime premium for all hours worked in excess of 40 in each week.

a. Set up a weekly payroll worksheet with the following columns: Employee No.; Name; Total hours worked; Earnings, regular; Earnings, overtime; Total earnings;

Exempt earnings, F.I.C.A. tax; F.I.C.A. tax deduction; Federal income tax withholding; Net amount paid. Complete the payroll worksheet.

b. Determine the amount of the taxable payroll for the F.I.C.A. tax.

c. Determine the amount of the taxable payroll for the F.U.T. and the S.U.T.

d. Prepare journal entries to record and pay the weekly payroll.

e. Prepare the journal entry to record the employer's payroll tax expense.

Problem 13

The following payroll data for the week ended Nov. 16 is taken from the City Wide Ads, Inc. which sells display advertising:

Employee No.	Name	Job or position	Wages paid during year to Nov. 9	Wage basis	Rate of pay	Hours worked	Income tax withholding
10	Anzee	General manager	$9,000	Weekly salary	$200	40	$29
21	Demper	Salesman	6,750	Weekly salary	150	40	6
32	Mene	Designer	3,550	Placards designed	5 per placard	44	9
41	Mobard	Accountant	4,500	Weekly salary	100	50	10
42	Rogan	Clerk	1,800	40-hr. week	60	48	10
44	Settler	Reception-ist	1,350	40-hr. week	50	40	7
33	Popper	Draftsman	2,500	48-hr. week	100	50	15
43	Wimer	Clerk	1,575	Hourly	1	45	2

The Wage basis column represents the method of payment agreed upon by the employer and the employee. Since the company is covered by the Federal Fair Labor Standards Act, all employees, except Anzee who has an administrative position, must be paid overtime for all hours worked in the excess of 40 in each week. Mene completed 11 placards during the week ended Nov. 16.

a. Prepare a weekly payroll sheet using the following columns: Employee No.; Name; Total hours worked; Earnings (subdivided to show regular, overtime, and total earnings); Exempt earnings, F.I.C.A. tax; F.I.C.A. tax deductions, Federal income tax withholding; and Net amount paid.

b. Prepare a journal entry to voucher and pay the payroll.

c. Prepare a journal entry to record the employer's payroll taxes.

Problem 14

Fit-Rite Tailors, Inc., makes and sells custom clothing for men. The firm pays its employees every Monday for wages earned during the previous week. It has a merit rating of 2%.

The employees are listed below; all are regularly employed throughout the year. All employees, except Abbe, are subject to the overtime provisions of the Federal Fair Labor Standards Act.

Name	Occupation	Wage		Wages paid from Jan. 1 to May 5	Hours worked during the week May 5–11	Federal income tax withheld
		Rate	Basis			
Abbe....	Manager	$200.00	Weekly	$3,600	40	$22.20
Beck....	Office girl	36.00	40-hr. week	690	44	6.20
Case.....	Designer	156.00	Weekly	2,900	48	20.80
Dean....	Cutter	100.00	40-hr. week	1,800	40	9.60
Eck.....	Sewer	25.20	Per suit	2,750	42	13.60
Fox.....	Finisher	2.00	Per hour	1,500	46	12.90
Gee.....	Presser	50.00	40-hr. week	950	40	1.80
Hite.....	Janitor	25.00	20-hr. week	450	20	None

Eck sewed six suits during the week.

a. Prepare a payroll for the week, May 5–11, using the following column headings: Name; Regular earnings; Overtime earnings; Total earnings; Earnings exempt from F.I.C.A. tax; Employees' F.I.C.A. tax deduction; Federal income tax withheld; and net amount paid.

b. What is the amount of the F.U.T.?

c. What is the amount of the S.U.T.?

d. Prepare journal entries to record the payroll and the employer's payroll taxes.

CHAPTER VII

Questions

1. Define overhead costs. What other terms are used frequently to signify these costs?

2. How do you account for the fact that overhead costs tend to become a proportionally larger share of the total cost to make and to sell products while the shares attributable to material and labor tend to decrease?

3. Why has the importance of overhead as an element of cost had such a belated recognition by accountants and managers of business enterprises?

4. Distinguish between *fixed*, *semifixed*, and *variable* overhead costs, giving an example of each.

5. If there are seasonal fluctuations in costs, are these costs considered to be variable?

6. How would you explain the following statement. "Fixed overhead costs are never absolutely fixed."

7. What recommendations would you make to management for the control of overhead costs?

8. Explain why overhead costs are an important factor in the determination of managerial policies dealing with production of a variety of products, extension of sales territories, and various forms of price discrimination.

9. How can you explain the following situation? Unit costs will rise during periods of low production, but will be lower when production is increased.

10. A successful businessman recently made the statement, "Current expansion of industry will result in idle plant capacity and smokeless chimneys." What is your explanation of this statement?

11. Would it be possible for a business to increase its net earnings by selling a part of its output below cost of production?

12. Explain how a business could increase its net earnings by producing a new product or entering a new market.

13. If a department or a territory is being operated at a loss, but the revenue from this segment of the business covers direct costs and variable overhead costs, what factors should be considered in deciding whether or not to discontinue the department or territory in question?

14. What four methods or points of view are available to management for the apportionment of overhead costs to divisions and units?

15. Indicate the base or bases that you would recommend to apportion the following overhead costs to production departments:

a. Supplies.
b. Repairs.
c. Taxes on buildings.
d. Executive salaries.
e. Rent.
f. Power and light.
g. Depreciation of equipment.
h. Fire insurance.
i. Indirect labor.

16. What control accounts would you recommend for overhead costs?

17. What problems of overhead distribution are to be found in cost accounting for sales agencies or sales divisions of manufacturing concerns?

18. What limitations and difficulties are to be found in overhead cost allocations?

19. In spite of the presence of imperfect methods of overhead cost allocations, what advantages and benefits can be attributed to cost accounting?

CHAPTER VIII

Questions

1. Why has budgeting become such an important part of the managerial control of all types of business and governmental enterprises?

2. Why is budgeting an integral part of modern cost accounting methods?

3. Discuss the economic significance of budgeting How may effective budgetary control be an important influence in the stabilization of an industry and of an individual concern?

4. Before a firm adopts a system of budgetary control, what plan of internal organization should be provided? What divisions and lines of authority should be established?

5. Trace briefly the general procedure followed in budget preparation.

6. What factors determine the length of the budget period for an individual firm? Discuss the use of the 13-period calendar, indicating the methods employed and the advantages accruing from the plan.

7. Discuss incentive plans for budget performance. In your opinion what types of rewards are the most effective.

8. Describe the general procedure of preparing sales budgets.

9. How are selling costs classified? What items of cost are included as selling costs?

10. Describe the procedure of preparing selling costs budgets. What types of budgets are required for an enterprise selling its products through its own established territories and district agencies?

11. What types of production and manufacturing budgets are generally prepared? What forms of data are included in production budgets?

12. Discuss briefly the preparation of each of the following budgets:

a. Materials budget.
b. Labor budget.
c. Factory overhead budget.
d. Plant and equipment budget.

13. Do you consider administrative budgets as important as production and selling cost budgets?

14. Why is the cash budget so important in the operation of most business enterprises?

15. Benedict M. Sayre of Chicago stated that a recent survey of business concerns with complete budget programs shows that some progress has been made in effective business management, but he is puzzled because there is not a wider acceptance of budget practices. He asks, "Could it be that management prefers expediency to planned policies? May not such *laissez faire* practices hasten irksome governmental planning?" (*The Controller*, November, 1949.) Use your knowledge of budgeting and business planning to explain what Mr. Sayre has in mind.

16. What program would you formulate to make the system of budgetary control function? What are the responsibilities of the accounting department? of the budget committee? of the department heads?

17. Explain what is meant by flexible budgeting.

CHAPTER IX

Questions

1. What features of job order cost accounting make it a valuable managerial tool?

2. What types of industries are the most suitable for adaptation of job order cost accounting methods?

3. What purposes are accomplished through the use of production orders or cost sheets? What types of production orders can be used?

4. Describe how costs may be accumulated in a decentralized cost accounting organization. How does the procedure differ when a centralized cost accounting organization is used?

5. Discuss the control of materials and supplies as provided for by a complete job order cost accounting system.

6. What general ledger and subsidiary record entries are required to record the purchase of materials for stock? to record the purchase of special materials and parts for immediate use in production processes? to record the purchase of repair parts for machinery and equipment used in the plant? to record the purchase of new machinery and equipment?

7. Describe the procedure required in issuing direct materials from stockrooms to be used in production; in issuing indirect materials from stockrooms to be used in factory operations. What general ledger and subsidiary record entry is necessary for direct materials? for indirect materials?

8. When unused materials are returned from the factory to stockrooms, what type of report is prepared? What general ledger and subsidiary record entries are required?

9. Do production orders serve as a perpetual inventory of work in process? Explain.

10. Discuss the control of labor costs as provided for by a complete job order cost accounting system.

11. What general ledger and subsidiary record entries are required to record the distribution of direct labor cost to work in process? to distribute the portion of the payroll representing indirect labor used in factory operations?

12. What subsidiary records are controlled by the Labor in Process account? What debits and credits are made to the account during the accounting period? What does the balance in the account represent at the end of the accounting period?

13. Discuss the problem of applying overhead to production, showing why it is the most important consideration in the operation of job order cost accounting systems.

14. Describe briefly early methods of applying factory overhead costs to production. What criticisms may be made of these methods?

15. What forms of improvement have been incorporated in modern methods of overhead application?

16. Why is budgeting an important part of plans of applying overhead to production? What is the general procedure of budgeting factory overhead? How are budgets of production prepared?

17. Why does the seasonal character of business activities present a problem in overhead application?

18. What are normal overhead rates? Why are they necessary? How are they computed?

19. Using as an illustration a business enterprise with which you are acquainted, explain the effects of not employing normal overhead rates in costing production. Explain how a normal overhead rate will result in more reliable cost analyses.

20. What are the percentage methods of applying overhead to production? Use one method in illustrating how rates are computed. Why are they considered inequitable and unsatisfactory?

21. What is the production unit method of applying overhead to production? Is it an equitable method? Has it received general application? Explain.

22. Compare the direct labor-hour method and the direct labor cost method. Under what circumstances is each used satisfactorily?

23. What method of overhead application would you recommend for a plant or production department in which piece-rates are the predominant form of wage payment? Explain and illustrate.

24. How is the machine-hour rate computed? What advantages are attributed to the use of this method?

25. What general ledger and subsidiary record entries are required to cost work in process through the use of a predetermined normal overhead rate?

26. Explain the accounting procedure followed in the accumulation of actual overhead during and at the close of the accounting period.

27. Explain briefly the budgeting and accounting procedure for manufacturing enterprises, which are not departmentalized, assuming that a predetermined, normal overhead rate is used as a part of the job order cost accounting system.

Problem 1

The following conditions have been reported for the Tabor Manufacturing Co. Prepare a journal entry to record each transaction and indicate entries to be made in subsidiary records.

1. The production foreman ordered 10 gal. of acid destroyed because of contamination. The acid had been requisitioned for job No. 130 and had a total value of $65. The loss was considered to have resulted from normal operations.

2. The fire-protection sprinkler system began operating accidentally owing to the unusually high temperature. Materials valued at $565, issued for use on job No. 3131, were damaged and returned to the stockroom. The scrap value of the damaged materials was $40.

3. Scrap leather from job No. 401, valued at $78, was returned to the stockroom.

4. The foreman of the building service department reported that 50 gal. of cleaning

solvent had been lost when a worker failed to close the valve on the container properly. The solvent had a value of $20.

5. During the month materials returned reports were summarized as follows:

Materials issued for use on production orders returned to stockroom, $1,565.

Materials issued for use in factory building maintenance returned to stockroom, $714.

Supplies issued for factory superintendent's office returned to stockroom, $19.

Problem 2

The following information is extracted from the payrolls of the Feist Fan Co. for the week ending Oct. 22:

	Payroll	Payroll taxes
Vice-president in charge of manufacturing	$ 250	
Factory superintendent	200	
Foreman	2,980	
Clerks and other factory office workers	1,457	
Factory workers, direct labor	5,786	
Factory workers, indirect labor	2,176	
Idle time, normal operations	287	
Idle time, abnormal conditions	50	
Vacation time	876	
Sick time	45	
Employer's F.I.C.A. tax on taxable payroll		$180
F.U.T. on taxable payroll		36
S.U.T. on taxable payroll		120
	$14,107	$336

The total factory payroll has been charged to the Factory Payroll Control account, and the taxes have been charged to the Payroll Tax Control account.

Prepare, in general journal form, the entry to distribute the payroll and the payroll taxes. Indicate in the explanation to the journal entry what entries would be made in the subsidiary cost records.

Problem 3

Assume that you have been requested to make a cost survey of the Los Angeles Brass Foundry where a job order cost system has been used for 10 years. All the workers performing direct labor operations are paid on a piece-rate basis. There are 10 different operations with a separate piece-rate for each operation and in the completion of jobs many of the workers perform each of the 10 operations. There is a great difference in the speed and efficiency of various workers. In discussing the productivity of workers, the plant superintendent laughingly said that he roughly divided his workers into three classes: the "supermen" who, because of unusual skill and experience, are able to produce a large number of units per hour; the "babbitts" who are average workers, capable of a fair amount of production per hour; and the "dopies" who seem to be inefficient, inexperienced, and bungling, and who can produce very little per hour.

The superintendent said he was not disturbed by the range of productivity of the three groups because the workers are all paid per piece and "if they don't produce they don't get paid."

As a cost accountant you are disturbed by the superintendent's lack of appreciation of the importance of overhead as an element of cost in relation to production costs per unit and per job. Upon investigation you discover that the overhead costs of the plant are allocated to jobs by the direct labor cost method thereby apportioning the same total overhead to each job, which has the same direct labor cost, regardless of the class or type of workmen employed on the job.

Criticize the direct labor cost method of overhead application for this concern, showing by means of examples why it is not equitable when piece-rates are used, and make whatever recommendations you think are appropriate.

Problem 4

The Marvin Machine Co. prepares its budgets quarterly and uses a factory overhead application rate based on each quarterly budget. An extract of the quarterly budgets for the year shows the following:

	Estimated factory overhead	Estimated direct labor-hours
1st quarter	$ 6,000	6,000
2d quarter	3,000	4,500
3d quarter	9,000	3,000
4th quarter	10,000	8,000

Assume that during each quarter a separate production order was sent through the plant, but for each order the total of the direct labor-hours was 300.

a. Compute the amount of overhead that would be applied to each of the orders.

b. How much overhead would have been applied to each of the orders if the company had used a normal overhead application rate?

Problem 5

The Miami Manufacturing Co. has a highly seasonal business with its production reaching the peak during April, May, and June. The company operates in connection with a plan of budgetary control and recently has had a job order cost system installed.

The following estimates were obtained from the overhead and production budgets for the year:

Month	Factory overhead	Direct labor cost	Direct labor-hours	Machine-hours
January	$2,000	$3,500	5,000	1,500
February	2,100	3,800	5,200	1,600
March	2,400	4,300	6,400	1,900
April	2,800	5,000	6,800	2,300
May	3,000	5,800	7,100	3,000
June	2,900	6,000	7,500	3,900
July	2,500	4,500	6,500	2,800
August	2,300	4,100	5,800	2,100
September	2,350	4,300	6,200	2,500
October	2,150	3,600	5,300	1,700
November	2,000	3,000	5,000	1,650
December	2,500	1,000	500	300

The plant is closed for two weeks each year in December when inventories are taken and plant repairs are made.

a. Prepare normal overhead application rates, using three different bases or methods.

b. Prepare a schedule showing the application of each of the three rates to production order 900 which contains the following information: direct material cost, $42; direct labor cost, $45; direct labor-hours, 30; and machine-hours, 20.

c. Advise management as to the most equitable overhead rate or rates giving the conditions under which each rate might be the most advantageous.

Problem 6

The Tornado Fan Co. is a manufacturer of a variety of house, office, and attic fans for homes and business enterprises. The company has a job order cost system which permits the identification of direct material and labor costs for each type of fan produced, with a separate production order cost sheet for each scheduled quantity or "run."

For a number of years, the company has followed the policy of distributing overhead costs to production through the medium of a single overhead rate for the entire plant, computed by means of the following formula:

$$\frac{\text{Estimated overhead for year}}{\text{Estimated prime cost (direct material + direct labor) for year}}$$

The total prime cost of manufacturing fans consists of approximately 85% of material and 15% of labor.

Recently the company received a government contract to produce parts for three aircraft companies. It is estimated that the *prime cost* of producing in accordance with the government contract will consist of 15% of material and 85% of labor. The company will continue to produce fans for its own customers but will be forced to limit its output to approximately 40% of its total production, the government contract accounting for 60% of the plant output.

The comptroller of the company proposes that the use of a single overhead application rate be continued in costing the entire plant production but that the method be changed from the "prime cost" to the "direct labor cost" basis of overhead allocation. He argues that this change will result in a more equitable overhead allocation to both the company's own products and the production under the government contract. The government cost accountant, assigned to audit and approve all costs in connection with the cost-plus-fixed-fee contract, disagrees with the comptroller in regard to the proposed change in the distribution of overhead costs and insists that the "prime cost" method be continued because it is more equitable.

Assuming that you have been brought into the controversy to examine all the evidence, submit a concise report to the board of directors of the Tornado Fan Co. regarding your findings and recommendations.

Problem 7

The Burch Box Co. has an estimated factory overhead for the year of $18,000 and estimated machine-hours of 36,000. The company uses the machine-hour method of computing the normal factory overhead application rate. During the month of February the company processed the following production orders.

Producton Order No.	Machine-hours
413	400
415	1,000
416	1,800
417	400
418	100

a. Compute the machine-hour factory overhead application rate.

b. Using the rate computed in *a* above, prepare an applied factory overhead analysis sheet.

c. Using the applied factory overhead analysis sheet as a basis, prepare a journal entry to record the summary information.

Problem 8

The Chriss Casting Co. has a centralized cost accounting system. Cost information is entered on the production orders in the cost accounting office during the month, and the information is used as a basis for summarizing costs at the close of the month. The following information is available for the month of May.

Production order No.	Direct material	Direct labor	Applied factory overhead
589	$1,500	$300	$150
590	700	180	78
591	1,400	400	136
592	500	456	175
593	1,100	550	235
594	1,300	700	410
595	575	360	180

Prepare a journal entry to record the above information.

Problem 9

Prepare journal entries to record the following disconnected transactions for the Campbell Assemblies, Inc. As an explanation for each journal entry indicate what subsidiary cost record should be made.

1. Purchased special materials for immediate use in factory production for job No. 290, $435.
2. Materials returned to supplier from stockroom, $58.
3. Indirect materials to be used in machinery repair returned to supplier after issued from stockroom, $490.
4. Direct materials returned to stockroom, $1,500.
5. Spoiled material in stockroom discarded with no scrap value, $35 (considered to be normal condition).
6. Recognition of expired insurance, $160.
7. Factory overhead applied to production, $432.
8. Payment of factory rent, $1,000.
9. Direct material requisitions summarized, $4,567.
10. Utilities paid, $340.
11. Factory payroll distributed: direct labor, $4,000; indirect labor, $1,500.

Problem 10

The following data are a summary of the information shown on the four production orders for 1 month for the Burton Machine Co. Production orders Nos. 1, 2, and 3 were completed during the month; No. 4 was unfinished at the end of the month. None of the production has been sold during the month.

	Production orders				Total
	No. 1	No. 2	No. 3	No. 4	
Direct material	$3,100	$2,900	$3,000	$1,000	$10,000
Direct labor	4,540	4,460	4,500	1,500	15,000
Applied factory overhead	1,460	1,300	1,380	460	4,600
Total	$9,100	$8,660	$8,880	$2,960	$29,600

Entries for the purchase of materials, the vouchering of the payroll, and the recording of the actual factory overhead have already been made. Prepare the following additional journal entries in order to summarize the information in the proper general ledger accounts.

a. Direct materials requisitioned from the stockroom for all production orders.
b. Distribution of the payroll, which includes $4,000 of indirect labor.
c. Application of factory overhead to production.
d. Transfer of completed production orders Nos. 1, 2, and 3 to finished stock.

Problem 11

The Wiley Co. processes jobs according to special order. The budget for the year shows a total estimate of $18,000 for overhead costs and 30,000 direct labor-hours of production.

The following transactions occurred during July:

1. Materials purchased on account, $21,000. Supplies purchased for cash, $1,200.
2. Direct materials requisitioned for use in production, $15,000.
3. Supplies (indirect) issued from stockroom, $250.
4. Payroll vouchered and paid: direct labor, $9,000; indirect labor $1,640. (Omit payroll taxes.)
5. Overhead costs vouchered and paid: rent, $400; utilities, $100; repairs, $200.
6. Adjusting entries were made to recognize the following unrecorded costs: depreciation on machinery, $125; accrued property taxes, $140.
7. Direct labor-hours applied to work in process totaled 4,620.
8. Work in process inventory at the close of the month was material in process, $1,200; labor in process, $700; and overhead in process, $200.
9. Finished goods inventory, July 31, $4,000.
10. Selling price of goods sold during month, $21,620. All sales were for cash.

Prepare journal entries to record the transactions for the month and to recognize the factory overhead variance.

Problem 12

The Voltz Cable Co. processes jobs according to special order. The budget for the year shows a total estimate of $48,000 for overhead costs and 120,000 direct labor-hours of production. The following transactions occurred during January:

1. Materials purchased on account, $8,000.
2. Direct materials requisitioned for use in production, $5,000.
3. Supplies issued from the stockroom, $400.
4. Payroll vouchered and paid: direct labor, $8,000; indirect labor, $1,400. (Omit payroll taxes.)

5. Overhead costs vouchered and paid: rent, $200; repairs, $150; utilities, $300.

6. Adjusting entries were made to recognize the following unrecorded costs: depreciation on machinery, $200; accrued property taxes, $140.

7. Direct labor-hours applied to work in process totaled 5,000.

8. The work in process inventory at the close of the month was material in process, $500; labor in process, $300; overhead in process, $200.

9. Finished goods inventory, Jan. 31, $1,000.

10. Selling price of goods sold during month, $12,000. All sales were for cash.

Prepare journal entries to record the transactions for the month and to recognize the factory overhead variance.

Problem 13

The Sutton Steel Co. fabricates steel products in accordance with specifications contained in special orders from customers. The company uses a job order cost accounting system. Transactions are recorded in three records of original entry: a general journal; voucher register with the following money columns: Vouchers Payable, Materials Control, Materials in Process, Payroll Control, Factory Overhead Control, and Sundry (subdivided to show Account Name, Dr. and Cr.); and check register with the following money columns: Vouchers Payable, Purchase Discount, and Cash in Bank.

Record each of the following transactions for May in the proper record, showing debits and credits to the proper general ledger accounts:

1. Purchase of materials for stock, $5,000; voucher 892, terms, 2/10, n/60, payable to the New Jersey Metal Co.

2. Purchase of repair parts for machine 9, $45; voucher 893, terms, n/30, payable to the Universal Parts Co.

3. Paid voucher 892 with check 1216, taking discount.

4. Vouchered payroll, voucher 894; wages earned, $8,000; withholdings: F.I.C.A. tax, $110; income tax, $1,200.

5. Paid voucher 894 with check 1217, payable to paymaster.

6. Purchase of special materials for production order 12, $85; voucher 895, terms cash, payable to the New England Parts Co., check 1218.

7. Purchase of supplies for stock, $125; voucher 896, terms, 2/10, n/30, payable to the Boston Supply Co.

8. The summary of materials and supplies requisitioned from the stockroom shows direct materials, $2,800; indirect materials, $480.

9. Supplies covered by voucher 896 are returned to the vendor as unsatisfactory; amount $25. The balance of the amount owed on voucher 896 is paid by check 1219, discount being taken.

10. A summary of materials returned to the stockrooms shows direct materials returned for credit, $150; indirect materials, $24.

11. Paid voucher 893 with check 1220.

12. Rent for month, $400, is paid to the Universal Reality Co; voucher 897, check 1221.

13. Depreciation of machinery and equipment for month, $800.

14. Insurance expired, $25.

15. A summary of the month's payrolls shows direct labor $6,000; indirect labor, $2,000. Distribute the payroll.

16. Power and light bill for $200 is vouchered; voucher 899, payable to the City Power and Light Co. Voucher 898 has been spoiled and canceled.

17. Employer's payroll taxes for month, $315.

18. Physical inventory of materials and supplies, $2,000; perpetual inventory records, $2,100.

19. Total amount of factory overhead applied to production by the overhead rate, $4,000.

20. Transfer of goods completed during the month to finished goods; cost: material, $2,000; labor, $5,000; factory overhead, $2,500.

21. Summary of sales for the month: cash sales, $2,000; credit sales, $15,000; cost of sales, $12,000.

CHAPTER X

Questions

1. Why is departmentalization of a business enterprise an important aid to cost and managerial control? Do the views of an administrator and the cost accountant coincide or differ as to the departmentalization of a factory?

2. Distinguish between service and production departments. What factors are considered in determining departmental lines?

3. Outline a general plan of cost accounting for enterprises using normal predetermined departmental overhead rates.

4. Explain how estimates of overhead are classified by service and production departments.

5. How are predetermined departmental overhead rates computed? What conditions within a department warrant the use of direct labor-hours as a base? direct labor cost? machine-hours? What are individual machine-hour rates? What is the composite machine-hour rate?

6. A factory has three production departments: Dept. A is highly mechanized and has only five workers; Dept. B has a high labor cost but wages are uniform; and Dept. C has a high labor cost, but rates of pay vary materially. What method of applying overhead would you recommend for each department?

7. In Dept. X there are 20 employees and $500,000 worth of machinery; in Dept. Y there are 200 employees and $50,000 worth of machinery. Of what importance are these data in the selection of an overhead rate for each department?

8. Describe the general ledger account and subsidiary record relationships which may exist in a departmentalized factory.

9. Explain the accounting procedure when departmental overhead rates are used to apply overhead to production.

10. Explain the accounting procedure involved in accumulating and classifying actual overhead by service and production departments, indicating both the general ledger and the subsidiary record entries.

11. Explain how service departments' costs are transferred to production departments' accounts and to standing orders.

12. Does the total of the balances of the primary standing orders equal the total of the balances of the secondary standing orders?

13. Are the balances of the Applied Factory Overhead accounts (by departments) supposed to be equal to the balance of the Factory Overhead Control account?

14. Assume that the comptroller of your concern says to you, "I see that Dept. X has a debit variance of $1,200 and Dept. Y has a credit variance of $500 for January. Please investigate these variances and prepare a report for me." Prepare a report for the comptroller with the following sections:

a. Possible causes of the variances.

b. Analysis of the causes, explaining *where* you obtained your data and *how* such data were valuable in arriving at your decisions as to causes of variances.

c. Recommendations for the disposition of the variances.

15. What are some of the problems to be considered when making the decision as to whether or not to use the supplementary rate method of disposing of variances resulting from the use of incorrect overhead rates? What alternative method of disposing of variances may be used?

Problem 1

Prepare entries in journal form to record the following transactions for the Penfold Co., which has a job order cost system:

1. Direct materials amounting to $5,200 are requisitioned from the stockroom for use in production.

2. The payroll, which has already been vouchered and paid, is distributed as follows: direct labor, $9,100; indirect labor, $900.

3. Factory overhead is to be applied to production as follows:

Dept. A	$1,550
Dept. B	1,710

4. The actual Factory Overhead Control account has a balance of $3,300. It is to be closed equally to the three departments: A, B, and C.

5. Department C, a service department, has its actual factory overhead costs allocated equally to A and B.

6. Departmental applied factory overhead and actual factory overhead accounts are closed to the variance accounts.

Problem 2

The Ubella Co. has a job order cost system.

The factory overhead cost sheet prepared at the end of the month showed total costs for production departments as follows:

Cutting	$38,620
Finishing and sanding	8,490
Fitting and assembling	3,860
Painting	1,910

Factory overhead has been applied to jobs as follows:

Cutting, $1.30 per machine-hour for 29,000 hr.
Finishing and sanding, $1.00 per direct labor-hour for 9,000 hr.
Fitting and assembling, 80% of direct labor cost for $4,900 direct labor.
Painting, $2 per piece finished for 920 pieces.

a. Prepare an entry to close the Factory Overhead Control account to the departmental overhead accounts.

b. Prepare an entry to record the factory overhead applied for the month.

c. State whether the overhead is over- or underabsorbed for each department and the amount of the variance for each department.

Problem 3

The Kasey Co. has three production departments which are designated as A, B, and C. The predetermined factory overhead rate for each department is as follows:

Department A, $1.60 per direct labor-hour.
Department B, $3.00 per machine-hour.
Department C, $1.70 per direct labor-hour.

Production order No. 40 is processed in each of the three departments. The direct charges to the order are as follows:

	Dept. A	Dept. B	Dept. C
Materials	$25	$5	$10
Labor:			
10 hr. @ $2.50	$25		
2 hr. @ $2.00		$4	
10 hr. @ $3.00			$30
Machine-hours		10 hr.	

Assume that entries are to be made to the general ledger accounts for this production order. Prepare entries in journal form to record costs for the job and its transfer to finished goods. Indicate the entries to be made in the subsidiary records.

Problem 4

The following cost statement gives a summary of the production for 1 month for the Ramsey Manufacturing Co.

Costs	Total	Production departments			Service departments	
		1	2	3	A	B
Direct materials	$10,000	$4,000	$3,500	$2,500		
Direct labor	15,000	5,000	5,000	5,000		
Factory overhead (actual)	4,800	800	1,000	1,500	$900	$600
Applied factory overhead	4,600	1,400	1,500	1,700		

Production completed:

Material	$ 9,000
Labor	13,500
Applied factory overhead	4,140
Total	$26,640

a. Journalize the direct materials put into production.

b. Journalize the direct labor that entered production.

c. Journalize the recording of the actual factory overhead, assuming that the total is vouchered.

d. Journalize the closing of the total actual factory overhead to the departmental overhead accounts.

e. Journalize the closing of the service departments' overhead costs to the production departments, assuming equal charges to each production department.

f. Journalize the factory overhead applied to production.

g. Journalize the completed production.

h. Journalize the setting up of the work in process inventory.

i. Journalize the closing of the actual and applied factory overhead accounts.

j. Assuming that the overhead variances are due to incorrect rates, that none of the month's production has been sold, and that there were no beginning inventories, journalize the closing of the variance accounts. (The distribution should be proportionate to the value of the month's production remaining in inventories.)

Problem 5

The following statement contains information regarding factory overhead costs for June for the Grear Fabricating Co.

MONTHLY SUMMARY OF OVERHEAD COSTS

Costs	Total costs	Service department costs			Production department costs		
		A	B	C	I	II	III
Executive salaries	$1,000	$ 600	$400.00				
Indirect labor	2,102		100.00	$422.00	$ 520.00	$ 610.00	$ 450.00
Clerical salaries	500	400	100.00				
Supplies	770	40	50.00	100.00	200.00	180.00	200.00
Depreciation	400	20	10.00	20.00	200.00	100.00	50.00
Property taxes	100	5	2.50	5.00	50.00	25.00	12.50
Payroll taxes	388	40	24.00	16.88	38.00	174.48	94.64
Rent	400	32	32.00	16.00	80.00	160.00	80.00
Power and light	260	13	13.00	26.00	130.00	52.00	26.00
Fire insurance	20	1	0.50	1.00	10.00	5.00	2.50
Telephone and telegraph	50	50					
Repairs	150				150.00		
Total departmental costs	$6,140	$1,201	$732.00	$606.88	$1,378.00	$1,306.48	$ 915.64
Apportioned actual cost, Dept. A		1,201			360.30	600.50	240.20
Apportioned actual cost, Dept. B			732.00		202.80	366.00	73.20
Apportioned actual cost, Dept. C				606.88	151.72	303.44	151.72
Total actual cost					$2,182.82	$2,576.42	$1,380.76
Overhead cost applied to production by means of overhead application rates					$2,152.00	$2,080.00	$1,410.00

Prepare in general journal form all entries to the general ledger accounts. Assume that any variances will be treated as deferred items.

Problem 6

The Piney Woods Co. has production departments A, B, and C, and service department D. The annual budget for the production departments after the estimated costs of service department D have been closed to them show the following information:

Dept.	Estimated factory overhead	Estimated direct labor cost	Estimated direct labor-hours	Estimated machine-hours
A	$15,000	$20,000	$18,000	$ 8,000
B	10,000	14,000	12,000	20,000
C	24,000	35,000	30,000	12,000

The following schedules show the actual factory overhead costs for January and the bases of apportionment to production and service departments:

Cost	Amount	Bases of apportionment
Rent	$1,000	Square feet
Payroll taxes	400	Wage payments
Depreciation	1,300	Investment
Light and power	1,400	Kilowatt-hours
Superintendence	900	Number of employees

Departmental data

Dept.	Sq. ft.	No. of employees	Total wage payments	Kilowatt-hours	Investment
A	600	14	$24,000	600	$10,000
B	1,200	11	18,000	1,200	60,000
C	500	20	36,000	900	20,000
D	200	5	2,000	300	10,000

a. Compute an overhead rate for each production department by the following methods:

(1) Department A, direct labor cost.
(2) Department B, machine-hours.
(3) Department C, direct labor-hours.

b. Prepare a schedule to show the distribution of actual overhead costs for January to the departments. Close out the service department costs to the production departments on the basis of the investment.

c. Prepare journal entries to summarize the following transactions for January. Explain in detail immediately below each journal entry the books of original entry in which the entries would be entered and the entries required in subsidiary cost records:

(1) Purchase of materials for stock, $21,960.
(2) Direct materials requisitioned for use in production, $5,200.
(3) Purchase of special parts for immediate use in production, $1,250.
(4) Payroll vouchered and paid: direct labor, $9,100; superintendence, $900. (Ignore payroll withholdings.)
(5) Distribute payroll.
(6) Record the actual overhead costs.
(7) Use the overhead application rates to apply the factory overhead to January production:

Department A, direct labor cost, $2,000.
Department B, machine-hours, 1,500.
Department C, direct labor-hours, 1,000.

(8) Close actual factory overhead for January to production and service departments.
(9) Close service department D actual factory overhead costs to production departments.
(10) Close departmental applied factory overhead and actual factory overhead accounts and set up departmental variance accounts.

Problem 7

A manufacturing concern which uses an historical cost system and applied manufacturing expense on the basis of "predetermined" or "fixed" rates, has the following accounts on its books at the end of its fiscal year:

Manufacturing expense (debit)	$217,384
Manufacturing expense applied (credit)	182,952
Work in process (debit)	70,740
Finished goods (debit)	115,366
Cost of goods sold (debit)	420,294

You are to give two acceptable methods of disposing of the $217,384 Manufacturing Expense and the $182,952 Manufacturing Expense Applied balances, and give the arguments for and against each method, setting forth any necessary assumptions you make. You need not work out any computations.

(Uniform Certified Public Accountant Examination, May, 1949)

Problem 8

The Waverly Manufacturing Company has decided to change its method of distributing factory burden to its products, all of which are manufactured on special order. You are asked (a) to develop appropriate departmental rates, based on the company's operations for the first half of 1948, and (b) to illustrate their use by determining the cost of Job Order No. 987 by applying the rates you develop.

The trial balance of the company's factory ledger (cents omitted), for the six months ended June 30, 1948, is as follows:

	Debit	Credit
Materials and manufacturing supplies	$ 85,321	
Work-in-process—material	86,105	
Work-in-process—labor	82,872	
Work-in-process—manufacturing expenses	161,480	
Indirect labor	41,740	
Factory rent	2,400	
Insurance—machinery and equipment	4,216	
Compensation insurance	2,486	
Superintendence	6,000	
Factory clerical salaries	4,950	
Machinery maintenance and repairs	31,010	
Depreciation of machinery and equipment	42,800	
Fuel	3,172	
Electricity	2,178	
Manufacturing supplies used	3,617	
Social security taxes	9,210	
Factory office supplies	879	
Miscellaneous factory expense	1,212	
Manufacturing expense applied		$158,200
General ledger control		413,448
	$571,648	$571,648

Additional data:

The manufacturing operations are carried on in three production departments, A, B, and C, with the aid of two service departments, numbered 1 and 2, respectively. Other data are as follows:

	Total	Departments				
		A	B	C	1	2
Plant floor space	30,000 sq. ft.	10,000 sq. ft.	5,000 sq. ft.	2,000 sq. ft.	7,500 sq. ft.	5,500 sq. ft.
Number of employees	109	50	20	4	25	10
Number of labor hours	113,360	52,000	20,800	4,160	26,000	10,400
Number of machine hours	47,952	31,912	9,640	560	5,840	—
Salaries and wages	$161,317	$76,180	$28,472	$9,975	$37,230	$9,460
Cost of machinery and equipment	$1,019,047	$623,225	$250,960	$20,210	$112,862	$11,790
Annual depreciation rates		8%	8%	10%	10%	20%

In developing burden rates, expenses not distributed in the above table shall be distributed to departments as follows:

On the basis of floor space:
  Factory rent; fuel; ¼ of electricity
On the basis of salaries and wages:
  Compensation insurance
  Superintendence
  Manufacturing supplies used
  Social security taxes
  Factory office supplies
  Miscellaneous factory expense
On the basis of investment in machinery and equipment:
  Insurance, machinery and equipment
  Machinery maintenance and repairs
  ¾ of electricity

Factory clerical salaries and $4,510 of indirect labor are charged to Department No. 2. The balance of indirect labor is charged to Department No. 1.

Expenses of Department No. 1 are to be distributed, 1/10 to Department No. 2, the balance to all other departments on the basis of machine hours.

Expenses of Department No. 2 are to be distributed to Departments A, B, and C, on the basis of labor hours.

The departmental burden rates are to be based on machine hours for Departments A and B, and on labor hours for Department C.

Data applicable to Job Order No. 987 are as follows:

Material, $487.92; direct labor, $465.00.
Machine hours: Department A, 50 hours.
Department B, 12 hours.
Labor hours: Department C, 20 hours

(Uniform Certified Public Accountant Examination, November, 1948)

Problem 9

The United Printing Co. specializes in job printing for public utilities, cities, counties, and state governments. The plant is departmentalized as follows: setting and composing, press, and cutting and binding. The annual budget contains the following estimates:

Department	Plant overhead	Direct labor cost	Direct labor-hours	Machine-hours	Basis for department overhead rate
Setting and composing....	$15,000	$20,000	30,000	6,000	Labor-hours
Press....................	5,000	10,000	10,000	20,000	Machine-hours
Cutting and binding......	8,000	20,000	10,000	2,000	Labor-hours

The transactions for January are summarized as follows:

1. Material purchases vouchered and paid, $2,000.
2. Materials requisitioned from stockroom: direct, $1,160; indirect, $600.
3. Payrolls vouchered and paid: direct labor, $2,215; indirect labor, $600; deductions; F.I.C.A. taxes, $28.15; income taxes, $425.
4. Factory overhead costs vouchered and paid: rent, $200; insurance, $50; repairs, $125; heat, $100; light and power, $75.
5. Adjusting entries were made as follows: depreciation on machinery, $50; taxes accrued, $150; employer's payroll taxes, $112.60.
6. Production departments were charged with overhead costs as follows: setting and composing, $850; press, $562.60; cutting and binding, $650.
7. Administrative costs vouchered and paid, $1,000.
8. Selling costs vouchered and paid, $400.
9. The following information has been obtained from the production orders and sales orders:

Job order No.	Setting and composing			Press			Cutting and binding			Selling price
	Direct labor-hours	Direct labor costs	Direct materials requisitioned	Direct labor costs	Machine-hours	Direct materials requisitioned	Direct labor-hours	Direct labor costs	Direct materials requisitioned	
150	200	$150	None	$100	400	$ 50	200	$250	$ 40	$1,000
151	400	340	$50	150	500	200	600	500	100	1,900
152	50	25	5	50	100	400	100	135	65	1,200
153	250	175	None	200	280	250				
154	200	140	None							

10. Orders 150, 151, 152 are completed and delivered for a total sale price of $4,100 on account. Cost of Work Completed is debited for production costs. Accounts Receivable is charged for the sales price.

11. Variances between actual and applied overhead costs are determined as follows: $100 of press department variance is due to incorrect rate; the balance and other departmental variances are due to seasonal conditions. The "supplementary" rate is used in disposing of the variance due to an incorrect overhead rate.

a. Compute the overhead rate for each department.

b. Prepare journal entries to record transactions for January including disposition of variances.

c. Prepare a schedule showing the cost of each production order and the gross profit or loss on the orders that have been sold.

Problem 10

The Prefabricated Garage Corp. manufactures ready-built two-car garages. The garages are built in sections ready for assembly by the purchaser. The company employs a job order system because the garages are built in lots of 10, each lot varying in appearance and minor details. Frequently garages are built in accordance with the specifications of customers.

The company has four production departments: mill, cabinet, finishing, and painting; and three service departments: factory office, planning, and maintenance. Budgets for the fiscal year show:

Department	Estimated factory overhead	Estimated direct labor cost	Estimated direct labor-hours	Estimated machine-hours	Floor space, sq. ft.
Mill....................	$20,000	$30,000	25,000	20,000	8,000
Cabinet................	8,000	15,000	20,000		4,000
Finishing..............	7,500	15,500	22,000		3,600
Painting...............	6,500	9,500	9,500		2,000
Factory office..........	8,500				800
Planning...............	4,500				600
Maintenance...........	3,000				1,000
Totals..............	$58,000	$70,000	76,500	20,000	20,000

Both estimated and actual service department costs are to be distributed directly to production departments on the following bases: factory office, direct labor-hours; planning, equally; and maintenance, floor space.

Factory overhead application methods are as follows: mill, estimated machine-hours; cabinet and finishing departments, estimated direct labor-hours; painting department, estimated direct labor cost.

In accordance with your instructions, your assistant has used the budget information that is available and the distribution bases that have been agreed upon in the preparation of the following schedule of the distribution of factory overhead costs to production departments for the year:

SCHEDULE OF DISTRIBUTION OF ESTIMATED FACTORY OVERHEAD COSTS TO PRODUCTION DEPARTMENTS

	Estimated overhead to be distributed	Mill	Cabinet	Finishing	Painting
Directly apportioned.....	$42,000	$20,000.00	$ 8,000.00	$ 7,500.00	$6,500.00
Factory office...........	8,500	2,777.78	2,222.22	2,444.44	1,055.56
Planning................	4,500	1,125.00	1,125.00	1,125.00	1,125.00
Maintenance............	3,000	1,363.63	681.82	613.64	340.91
Totals................	$58,000	$25,266.41	$12,029.04	$11,683.08	$9,021.47

On Jan. 31, in accordance with your instructions, your assistant summarized the actual overhead costs for the month, distributed the actual overhead costs to service

SCHEDULE OF DISTRIBUTION OF ACTUAL OVERHEAD COSTS TO DEPARTMENTS FOR JANUARY

Cost	Total amount	Factory office	Planning dept.	Maintenance dept.	Mill	Cabinet	Finishing	Painting
Payroll taxes	$ 500	$ 20.00	$ 15.00	$ 25.00	$ 200.00	$ 100.00	$ 90.00	$ 50.00
Property taxes	300	15.00	15.00	15.00	150.00	45.00	36.00	24.00
Depreciation	2,000	100.00	160.00	240.00	600.00	400.00	200.00	300.00
Indirect material	400	50.00	30.00	20.00	100.00	50.00	30.00	120.00
Power and light	200	3.00	2.00	5.00	110.00	30.00	35.00	15.00
Heat	250	10.00	7.50	12.50	100.00	50.00	45.00	25.00
Insurance	40	2.80	1.20	.80	20.00	8.00	4.00	3.20
Repairs	80				80.00			
Indirect labor	2,500	900.00	200.00	100.00	700.00	200.00	225.00	175.00
Total direct charges	$6,270	$1,100.80	$430.70	$418.30	$2,060.00	$ 883.00	$ 665.00	$ 712.20
Apportioned service dept. charges:								
Factory office		$1,100.80			151.25	378.14	336.12	235.29
Planning dept.			$430.70		107.68	107.68	107.67	107.67
Maintenance dept.				$418.30	190.14	95.07	85.56	47.53
Total production dept. costs					$2,509.07	$1,463.89	$1,194.35	$1,102.69

and production departments, and redistributed the service departments' cost to production departments, using the same distribution bases that were employed in the distribution of the estimated overhead costs at the beginning of the year. The schedule prepared by your assistant is given on page 512.

Inventory reports show: Jan. 1: materials, $6,000; finished goods, $5,000; Jan. 31: materials, $8,000; finished goods, $4,000. Materials purchased during the month, $12,000.

Production orders put into process and completed during the month are summarized as follows:

Department	Direct material cost	Direct labor cost	Direct labor-hours	Machine-hours
Mill	$6,000	$ 2,000	1,800	3,000
Cabinet	1,900	4,000	4,500	
Finishing	600	3,200	4,000	
Painting	1,100	2,800	2,800	
Totals	$9,600	$12,000	13,100	3,000

It may be assumed that all costs incurred are vouchered and paid. Sales for cash during January, $35,000.

a. Compute the factory overhead application rate for each production department.

b. Submit journal entries for all transactions for January; include any additional entries required to close the books as of Jan. 31.

c. Present journal entries to dispose of variances, assuming that they are the result of seasonal conditions of overhead and/or production.

Problem 11

The Newton Factory, Inc. manufactures small metal housewares. No service department designation exists, but the company maintains a departmental classification of productive activities in the operation of a job order cost system. The production departments are coded A, B, C, D, and E.

The budget of factory overhead for the year beginning Jan. 1, 19—, shows the following:

Supplies	$ 4,000
Indirect labor	14,000
Depreciation of machinery and equipment	5,000
Property taxes	1,800
Payroll taxes	2,000
Rent	2,200
Supervision salaries	8,000
Power and light	1,000
Insurance	400
Heat	600
Total estimated overhead costs	$39,000

Estimated overhead at the beginning of the period and actual overhead at the end of the period are to be distributed to departments on the following bases: indirect labor by survey percentages; depreciation, property taxes, and insurance by cost of machinery and equipment; rent, power and light, and heat by floor space; payroll taxes by direct labor cost; supervision salaries by direct labor-hours.

In applying factory overhead to production the rates used in each department are computed on the following bases: Depts. A and C, direct labor-hours; Depts. B and D, machine-hours; Dept. E, direct labor cost.

The production budget for the year shows the following estimates of direct labor costs, direct labor-hours, and machine-hours:

Department	Estimated direct labor cost	Estimated direct labor-hours	Estimated machine-hours
A	$ 4,000	6,000	4,200
B	6,000	8,000	4,400
C	3,000	6,000	3,800
D	10,000	12,000	5,000
E	9,000	8,000	6,600
Totals........	$32,000	40,000	24,000

Assume that, after the budgets of factory overhead costs have been approved by the president of the company, your assistant prepared the following schedule of estimated factory overhead costs as shown on page 515, classified by production departments, using the proper distribution base in each case:

The following information relates to the yearly operation:

1. Beginning inventories, Jan. 1, 19—: materials, $10,000; finished goods, $4,000.
2. Purchases of materials vouchered and paid, $18,000.
3. Materials requisitioned from the stockroom: direct materials, $20,000; supplies $4,200 (Dept. B requisitioned $200 in excess of its budget allotment).
4. Payrolls vouchered and paid; direct labor, $34,000; indirect labor, $11,500; supervision salaries, $8,000; withholdings deducted: F.I.C.A. tax $580; income tax, $7,900.
5. Depreciation of machinery and equipment, $5,000.
6. Other costs vouchered and paid: property taxes, $1,975; payroll taxes, $2,140; rent, $2,200; power and light $1,100; insurance, $400; heat, $550.
7. A summary of production orders completed during the year shows:

Department	Direct material cost	Direct labor cost	Direct labor-hours	Machine-hours
A	$ 3,000	$ 4,100	6,200	4,400
B	4,500	5,800	8,400	4,600
C	1,800	3,200	7,300	4,000
D	5,000	10,500	13,500	5,200
E	5,700	10,400	9,600	6,800
Totals.........	$20,000	$34,000	45,000	25,000

8. Finished goods inventory, Dec. 31, $6,000.
9. Sales during the year: on account, $20,000; cash, $100,000.

Assume that, immediately after the close of the year, your assistant prepared the following schedule of actual factory overhead costs, classified by production departments, using the same bases of distribution that he had employed in the allocation of

SCHEDULE OF DISTRIBUTION OF ESTIMATED OVERHEAD COSTS TO DEPARTMENTS

Cost	Basis of distribution	Total estimated costs	Dept. A	Dept. B	Dept. C	Dept. D	Dept. E
Supplies	Directly	$ 4,000	$ 200.00	$1,500.00	$ 600.00	$ 1,000.00	$ 700.00
Indirect labor	Survey	14,000	1,800.00	3,000.00	1,200.00	3,600.00	4,400.00
Depreciation	Cost of equipment	5,000	800.00	1,200.00	500.00	1,500.00	1,000.00
Property taxes	Cost of equipment	1,800	288.00	432.00	180.00	540.00	360.00
Payroll taxes	Direct labor cost	2,000	250.00	375.00	187.50	625.00	562.50
Rent	Floor space	2,200	146.67	256.67	73.33	586.67	1,136.66
Supervision salaries	Direct labor-hours	8,000	1,200.00	1,600.00	1,200.00	2,400.00	1,600.00
Power and light	Floor space	1,000	66.67	116.67	33.33	266.67	516.66
Insurance	Cost of equipment	400	64.00	96.00	40.00	120.00	80.00
Heat	Floor space	600	40.00	70.00	20.00	160.00	310.00
Totals		$39,000	$4,855.34	$8,646.34	$4,034.16	$10,798.34	$10,665.82

the budget estimates of factory overhead to the production departments at the beginning of the year:

Overhead cost	Totals	Dept. A	Dept. B	Dept. C	Dept. D	Dept. E
Supplies	$ 4,200	$ 200.00	$1,700.00	$ 600.00	$ 1,000.00	$ 700.00
Indirect labor	11,500	1,725.00	2,875.00	1,150.00	3,450.00	2,300.00
Depreciation	5,000	800.00	1,200.00	500.00	1,500.00	1,000.00
Property taxes	1,975	316.00	474.00	107.50	592.50	395.00
Payroll taxes	2,140	258.06	365.06	201.41	660.88	654.59
Rent	2,200	146.67	256.67	73.33	586.67	1,136.66
Supervision salaries	8,000	1,200.00	1,600.00	1,200.00	2,400.00	1,600.00
Power and light	1,100	73.34	128.33	36.67	293.33	568.33
Insurance	400	64.00	96.00	40.00	120.00	80.00
Heat	550	36.67	64.17	18.33	146.67	284.16
Totals	$37,065	$4,819.74	$8,759.23	$4,017.24	$10,750.05	$8,718.74

a. Compute the factory overhead application rate for each department.

b. Submit journal entries for all transactions for the year and any additional entries required to close the books at the end of the year.

c. Present journal entries to dispose of variances, assuming that they are the result of the use of incorrect overhead application rates. (The distribution should be proportionate to the value of the year's production remaining in inventories and represented by the cost of goods sold.)

CHAPTER XI

Questions

1. What financial and cost statements should be presented to management at the close of each accounting period?

2. Without using figures, describe the main sections that you would include in each of the statements mentioned in Question 1.

3. Describe briefly the process of closing the accounts at the end of an accounting period when a system of job order cost accounting is in use.

4. Explain how a debit variance would be shown in the financial and cost statements if it resulted from the use of an incorrect overhead application rate. How would the treatment differ if the variance was due to seasonal conditions of plant operations and a normal overhead rate was employed?

5. How are work in process and finished goods inventory records adjusted when the physical inventories are less than quantities shown in the accounting records? in excess of quantities shown in the accounting records?

6. Discuss the problems involved in accounting for idle time. If idle time is caused by abnormal conditions beyond the control of the production division, should the accounting treatment differ from that employed in accounting for normal idle time?

7. What two positions do cost accountants take regarding the treatment of overtime and bonuses? Give the arguments for and against each point of view.

8. Describe the proper accounting for overtime pay; for special bonuses.

9. Distinguish between spoiled and defective work. How would you treat spoiled work in the accounting records if it was attributed to normal conditions? to abnormal conditions?

10. How would you treat defective work in the accounting records if it resulted from normal conditions of plant operation? from abnormal conditions?

11. List the advantages of using a system of job order cost accounting.
12. What are the weaknesses or disadvantages of job order cost accounting?

Problem 1

Refer to Prob. 10, page 511. Using the information given for the Prefabricated Garage Corp., prepare

a. A statement of cost of finished goods manufactured for January.
b. A profit and loss statement for January.

Problem 2

Refer to Prob. 11, page 513. Using the information given for the Newton Factory, Inc., prepare

a. A statement of cost of finished goods manufactured for the year.
b. A profit and loss statement for the year.
c. Statement of actual and applied factory overhead costs and variances.

Problem 3

The trial balance of the Knisley Co. on June 30, before the books are closed, is given below:

TRIAL BALANCE, JUNE 30, 19__

	Dr.	Cr.
Cash	$ 14,235	
Accounts receivable	35,000	
Provision for bad debts		$ 1,700
Materials inventory, June 1	26,550	
Finished goods, June 1	4,000	
Prepaid fire insurance	270	
Machinery and equipment	60,000	
Accumulated depreciation		20,200
Vouchers payable		9,625
Accrued taxes		700
Accrued utility cost		396
Common stock		100,000
Earned surplus		8,936
Sales		9,800
Selling costs	600	
Administrative costs	500	
Direct material cost	6,880	
Direct labor cost	1,925	
Factory overhead costs	1,397	
	$151,357	$151,357

The following supplementary information is available:
Inventories as of June 30 at cost:

Materials	$26,550
Work in process	270
Finished goods	7,571

The variance between actual overhead costs of $1,397 and overhead costs, totaling $1,110, applied to production orders during June, is $287. The variance is analyzed and found to be due to an incorrect overhead application rate. The variance is apportioned to production as follows:

Work in process	$ 4
Finished goods	125
Cost of goods sold	158
Total factory overhead variances	$287

Required:

a. Statement of cost of finished goods manufactured for June.
b. Statement of cost of goods sold for June.
c. Profit and loss statement for June.

Problem 4

The Witt Painting Co., a corporation, specializes in commercial painting contracts. The company employs 20 painters, an accountant, and a manager. The accountant is responsible for the operation of a job order cost system. The post-closing trial balance on Mar. 31 is as follows:

TRIAL BALANCE OF WITT PAINTING CO., MAR. 31, 19__

	Dr.	Cr.
Cash in bank	$10,000	
Accounts receivable	12,000	
Materials and supplies	6,000	
Tools and equipment	4,000	
Prepaid insurance	1,500	
Accumulated depreciation		$ 1,000
Vouchers payable		4,000
Employees' withholding for Federal income tax		800
Employees' withholding for F.I.C.A. tax		150
Capital stock		20,000
Earned Surplus		7,550
Totals	$33,500	$33,500

The classification of accounts shows the following additional accounts in the general ledger: Materials in Process, Labor in Process, Overhead in Process, Payroll Control, Overhead Control, Applied Overhead, Overhead Variance, Cost of Completed Work, Sales, and Profit and Loss.

Owing to the labor situation, it is not practical to prepare budgets for more than 3 months in advance. The budgets for the second quarter, April, May, and June, show estimated overhead costs of $6,000 and 10,000 direct labor-hours of work. The work scheduled for April is as follows: job 100, painting the City Hall; job 101, painting the Central Valley Mill; and job 102, painting the Union Station.

The transactions for April are given in detail or are summarized as follows:

1. Materials and supplies purchased on account for stock, $3,000.

2. Special materials purchased on account for immediate use on job 100, $100.

3. Supplies issued from stock for office, $65; supplies issued for jobs as an indirect charge, $200.

4. Direct materials requisitioned for jobs for the month are summarized as follows: job 100, $300; job 101, $450; and job 102, $275.

5. The monthly payroll vouchered and paid shows the following information: direct labor by jobs: job 100, 1,000 hr. @ total labor cost, $2,500; job 101, 1,250 hr. @ total labor cost, $3,000; job 102, 500 hr. @ total labor cost, $1,000; indirect labor: account-

ant, $400; manager, $500. Deductions were made when the wages earned above were vouchered and paid: F.I.C.A. taxes, $105; Federal income tax withheld, $700.

6. Overhead costs vouchered and paid: rent, $275; repairs for equipment, $150; utilities, $140; truck costs, $100.

7. Employer's payroll taxes are recorded for the month as an overhead cost and as an additional liability, $310.

8. Adjusting entries are made for the following: insurance cost, $75; depreciation, 4% per month of cost of tools and equipment.

9. The overhead rate is applied to each job.

10. Job 100 is completed, and the sales contract price is charged to the customer, $3,500; job 101 is completed and cash is received for the contract price, $4,500; job 102 is in process as uncompleted work on Apr. 30.

11. Analysis of the overhead variance discloses that it is due to an incorrect overhead rate. It is the policy to use a supplementary overhead rate, based on actual direct labor-hours, in adjusting each production order for its share of the over- or underapplied overhead costs.

a. Prepare production orders for jobs 100 to 102. In designing the form, insert a section for supplementary rate, contract price, and profit or loss.

b. Prepare journal entries to record the transactions for April and to close the books as of Apr. 30.

c. Set up general ledger accounts and post all transactions to accounts and to production orders.

d. Prepare a journal entry to dispose of the overhead variance; correct each production order for the supplementary overhead rate; and show the profit or loss on both completed jobs.

e. Prepare a trial balance as of Apr. 30 after the books have been closed.

f. Prepare a statement of cost of completed jobs for April.

g. Prepare a profit and loss statement for April.

h. Prepare a balance sheet as of Apr. 30.

Problem 5

The Western Construction Co. was recently incorporated as a builder of small fire-safe concrete homes which can be completed, ready for occupancy within 30 days. The company uses a job order cost system with a production order for each house which shows the material cost, labor cost, applied overhead cost, total cost, contract selling price, profit or loss, adjustment for overhead variance, and adjusted profit or loss. The company's trial balance on Jan. 1 is as follows:

TRIAL BALANCE OF WESTERN CONSTRUCTION CO., JAN. 1, 19—

	Dr.	Cr.
Cash in bank	$ 30,000	
Materials and supplies	40,000	
Tools and equipment	50,000	
Prepaid insurance	1,200	
Building	20,000	
Accumulated depreciation—tools and equipment		$ 5,000
Accumulated depreciation—building		2,000
Vouchers payable		30,000
Mortgage on building		5,000
Purchase contract—tools and equipment		25,000
Capital stock		70,000
Earned Surplus		4,200
Totals	$141,200	$141,200

In addition to those in the trial balance the company's classification of accounts lists the following cost accounts: Work in Process, Payroll Control, Overhead Control, Applied Overhead, Overhead Variance, Cost of Completed Houses, and Profit and Loss. Other financial accounts are Accrued Employer's Payroll Taxes, Employees' Withholding for F.I.C.A. Tax, Employees' Withholding for Federal Income Tax, Accrued Union Dues, Accrued Property Taxes, and Sales.

The budgets for the year show total estimated overhead costs of $120,000 and estimated direct labor-hours totaling 150,000. The direct labor-hour method of overhead application is used.

The transactions for January are given in detail or are summarized as follows:

1. Materials and supplies purchased on account, $25,000.
2. Supplies and indirect materials requisitioned from stock, $500.
3. Direct materials issued from stock for jobs, $10,000; materials purchased on account and charged directly to jobs, $4,000. The direct material charges to jobs are as follows:

Job No.	Direct material from stock	Material purchases charged directly to jobs
1	$ 2,500	$ 500
2	1,800	600
3	2,400	800
4	2,600	1,500
5	700	600
	$10,000	$4,000

4. Payroll costs for month, $15,000: payroll deductions: F.I.C.A. tax, $225; Federal income tax withheld, $2,500; union dues withheld, $300. The payroll is vouchered and paid. The payroll costs are distributed as follows:

	Direct labor cost	Direct labor-hours	Indirect labor
Job 1	$ 2,200	2,100	
Job 2	2,400	2,600	
Job 3	2,500	2,200	
Job 4	2,700	2,500	
Job 5	700	600	
Truckers' salaries			$1,000
Office salaries			1,500
Executive salaries			2,000
	$10,500	10,000	$4,500

5. The overhead rate is applied to each job, including those still uncompleted on Jan. 31.
6. The following jobs were completed during January and cash was received per contract: Job 1, $7,500; Job 2, $6,000; Job 3, $6,500; and Job 4, $8,000.
7. Employer's payroll taxes are recorded as a charge to Overhead Control and a credit to Accrued Employer's Payroll Taxes, $675.
8. Overhead costs vouchered and paid total, $100.
9. Depreciation for the month: tools and equipment, 2%; building, 1%.
10. Insurance expired, $100.
11. Property taxes accrued, $150.

12. The variance between actual and applied overhead is analyzed and one-half is considered to be the result of seasonal conditions, but the remainder is attributed to errors in computing the overhead application rate. The amount due to an incorrect rate is to be adjusted to work in process and cost of completed work by means of a supplementary overhead rate based on actual direct labor-hours for the month. Each production order should be corrected for its share of the variance due to the incorrect overhead rate.

a. Prepare production orders and record all data regarding each job.
b. Prepare journal entries to record the transactions for January.
c. Set up general ledger accounts and post all transactions from the journal.
d. Prepare a journal entry to record properly and distribute the overhead variance.
e. Prepare a trial balance as of Jan. 31 after the books have been closed.
f. Prepare a statement of cost of completed houses.
g. Prepare a profit and loss statement for January.
h. Prepare a balance sheet as of Jan. 31.

Problem 6

The Northeastern Machine Tool Co. began operations Jan. 1. It employs a job order cost accounting system in costing its production which consists of special orders received from other manufacturing concerns. The balance sheet of the enterprise on Jan. 1 was as follows:

NORTHEASTERN MACHINE TOOL CO.
BALANCE SHEET
Jan. 1, 19—

Cash in bank	$110,000	Vouchers payable	$115,000
Raw materials inventory	120,000	Bonds payable	220,000
Machinery and equipment	140,000	Capital stock	215,000
Building	122,000		
Patents	58,000		
	$550,000		$550,000

There are two production departments; Dept. X is composed primarily of labor operations by highly skilled and highly paid workers; Dept. Y is composed primarily of machine operations.

The budget information for January used in computing overhead rates for the application of factory overhead to production is as follows:

	Dept. X	Dept. Y
Estimated factory overhead	$4,000	$6,000
Estimated direct labor-hours	2,000	500
Estimated machine-hours	800	1,500

The following transactions occurred during the month of January:

1. Purchases of materials and supplies on account, $30,000.

2. Total payrolls vouchered and paid: direct labor, $8,800; wages and salaries of clerks, helpers, and executives, $6,000. (Ignore withholdings.)

3. Factory overhead vouchered and paid: repairs, $800; power and light, $400; telephone and telegraph, $50; water, $25; and trucking, $175.

4. Factory overhead recognized through adjusting journal entries: depreciation of machinery, $1,000; depreciation of building, $500; taxes, $200; insurance, $50.

5. Direct materials requisitioned and charged to production orders, $25,000; indirect materials used during the month, $600.

6. Direct labor-hours and machine-hours, incurred for production orders 1 to 21, inclusive, were as follows:

	Dept. X	Dept. Y
Actual direct labor-hours	1,800	520
Actual machine-hours	780	1,700

7. Production order 21, remaining uncompleted in Dept. X, the first department, shows direct materials totaling $1,200; 100 direct labor-hours; and direct labor cost, $400.

8. Actual factory overhead costs, totaling $9,800, were apportioned directly and by distribution bases to production departments as follows: Dept. X, $3,900; and Dept. Y, $5,900.

9. All work completed during the period, except production order 20 which shows a cost of $3,500, was sold for cash for $50,000.

10. An analysis of the variances between actual and applied factory overhead discloses that $300 in Dept. Y was due to an incorrect overhead application rate, but the remainder of the variance for Dept. Y and all the variance for Dept. X was the result of seasonal conditions.

Required:

a. Journal entries to record the month's transactions.

b. Journal entry to dispose of the departmental variances between actual and applied factory overhead costs.

c. A statement of cost of finished goods manufactured for January.

d. A statement of cost of goods sold for January.

e. A profit and loss statement for January.

f. A balance sheet as of Jan. 31.

Problem 7

The Norco Manufacturing Co., which has a job order cost system, prepares its budgets and closes its books for a 6-month period, which is considered a normal period of operation. On Jan. 1, the general ledger of the company contained the following open accounts:

Account	Dr.	Cr.
Cash in bank	$18,000	
Accounts receivable	15,000	
Provision for bad debts		$ 3,000
Materials	14,000	
Materials in process	3,000	
Labor in process	2,000	
Factory overhead in process	4,000	
Finished goods	7,000	
Machinery and equipment	20,000	
Accumulated depreciation for machinery and equipment		5,000
Bonds payable		7,000
Capital stock		50,000
Earned surplus		18,000
	$83,000	$83,000

Transactions from Jan. 1 to July 1 may be summarized as follows:

1. Purchases vouchered and paid, $24,000.

2. Materials requisitioned from stockroom: direct materials, $20,000; indirect materials, $6,000.

3. Payrolls vouchered and paid: direct labor, $40,000; indirect labor, $10,000; salaries, $15,000; withholdings: income tax, $14,000; F.I.C.A. tax, $900.

4. Factory overhead vouchered and paid: rent, $2,400; insurance, $450; repairs, $250; payroll taxes, $2,500.

5. Adjusting entries were made as follows: depreciation of machinery and equipment, $1,000; taxes accrued, $400.

6. Producing departments were charged with factory overhead costs as follows:

Department	
1	$ 9,000
2	8,000
3	9,500
4	11,500

7. Factory overhead was applied to production by means of predetermined overhead rates as follows:

Department	
1	$ 8,800
2	8,100
3	9,800
4	11,000

8. The cost of production orders completed and transferred to finished stock is as follows:

Direct material.............	$18,000
Direct labor................	35,000
Factory overhead...........	35,700

9. Sales for cash, $100,000; cost of goods sold, $80,000.

10. Selling costs vouchered and paid, $8,000.

11. Administrative costs vouchered and paid, $12,000.

12. Cash received from rent of office space to other concerns, $900.

13. *Interest paid on bonds, $200 (considered a nonoperating expense).*

14. Variances between actual and applied factory overhead are the result of the use of incorrect overhead application rates and should be apportioned to inventories and cost of goods sold in proportion to the value of goods manufactured remaining in each stage of completion and sale.

a. Prepare journal entries to record all transactions for the 6-month period.

b. Submit the following statements: a statement of cost of finished goods manufactured, a statement of cost of goods sold, a profit and loss statement, a statement of actual and applied factory overhead for production departments, and a balance sheet.

Problem 8

The following disconnected transactions are given for the Middletown Production Co:

1. Payroll for a week is paid: total amount earned, $13,000; F.I.C.A. tax deduction, $130; Federal income taxes withheld, $2,000; withheld for company pension plan, $650; net amount of cash paid, $10,220.

2. Distribution of week's payroll: direct labor, $8,000; foremen's salaries, $1,200; factory clerical salaries, $800; salaries of factory supervisors and executives, $3,000.

3. Included as indirect labor in the payroll for the week is $90 of wages of workmen who were engaged in installing new machinery and equipment.

4. Defective work transferred from production to the stockroom had been charged $75 for direct material and $25 for direct labor; scrap value of the materials is $10.

5. Goods completed and transferred to finished stores during the week have been charged $2,000 for direct materials and $3,000 for direct labor.

6. Normal idle time of factory workers for the week totals 60 hr. @ $1 per hour.

7. Abnormal idle time due to strike disturbances amounts to $1,000.

8. In the processing of production order 100, 10 units are found to be defective and 5 hr. of direct labor @ $1.25 an hour is required to bring these units up to standard specifications.

a. Prepare general journal entries for each transaction.

b. Indicate what entries are required in subsidiary cost records.

Problem 9

The management of the Toledo Machine Works, a newly formed company, has signed a contract with the union representing its factory workers, whereby time and a half will be paid for all work over 40 hr. per week except that double time will be paid for continuous work over 48 hr. per week. The management has approved a plan of Christmas bonuses, the amount dependent upon the number of weeks of continuous employment.

A job order cost system is being installed and the question of the proper treatment of the overtime pay and Christmas bonuses has arisen. The cost accountant contends that overtime and bonus payments should follow the regular wage payments in allocation to jobs or to overhead; *i.e.*, the overtime and bonuses paid to workers whose assignments are to particular jobs should be charged to these jobs while extra pay given to clerks, foremen, and other indirect workers should be treated as an overhead cost.

The sales manager and the factory superintendent violently disagree. They contend that such a plan is unfair, particularly since the company accepts many special orders on a cost plus 20% profit basis and, in general, determines selling prices of special orders upon the basis of a markup on cost as shown by production orders. The factory superintendent advocates treating overtime and bonuses as overhead costs, thereby spreading such "abnormal" costs over all production for the accounting period, regardless of the actual dates when each job was processed. The sales manager contends that these costs are not factory costs chargeable to regular production but are the result of general administrative policies and should be charged to the General Profit and Loss account.

Assume that you have been brought into the controversy as an expert on such matters. Prepare a written report for the president of the company, briefly outlining the arguments for and against each of the proposed plans, and concluding with your recommendations.

CHAPTER XII

Questions

1. To what types of industries is process cost accounting best adapted? What methods of production within an enterprise are most favorable in the use of process cost methods?

2. Of what value for managerial control is the average cost of a product? Is an average a typical cost? a true cost? a reliable cost?

3. Describe briefly the general accounting principles underlying the operation of a system of process cost accounting.

4. What is meant by departmentalization of a factory? What factors are the basis for setting departmental lines? Of what value is proper departmentalization in the operation of a system of process cost accounting?

5. Describe the accounting procedure involved in the issue of materials from the stockroom to processes.

6. Trace the entries required to record weekly labor and supervision payrolls and to handle the disbursement of payrolls.

7. Explain the general procedure required to record factory overhead costs, exclusive of materials and labor, and to distribute them to processes.

8. What basis would you recommend as being equitable for the distribution of the following overhead costs to processes:

a. Rent?
b. Heat?
c. Power and light?
d. Unemployment compensation taxes?
e. Repairs?
f. Fire insurance?
g. Depreciation of machinery?
h. Supervisory payrolls?

9. What type of production records should be maintained for each process? What use is made of the production statistics?

10. Distinguish between single product, single process industries and single product, multiple process industries, giving an example of each.

11. How are work in process inventories computed? What is meant by production in terms of completed products?

12. How are work in process inventories evaluated when material is added at the beginning of the process? at the end of the process? at various stages of completion in the process?

13. How are unit costs computed when there are both beginning and ending inventories by the average method? by the first-in, first-out method?

14. What is the effect of using each of these methods on inventory values when costs are increasing rapidly? when costs are decreasing?

15. What policy is followed in computing costs when work is spoiled or units are lost due to normal conditions of plant operation? How does the computation of costs differ when the spoiled or lost units are the result of abnormal conditions of plant operation?

16. Explain how unit costs are affected in the third process of a series of five processes required to complete a product when 50 units are lost which had an accumulated cost of $1 a unit when transferred to the third process. You may assume that the loss is considered to be normal.

17. How should idle time be accounted for and treated when a process cost accounting system is in use? Should normal idle time receive a different treatment from abnormal idle time? Explain.

18. Describe the method of determining total costs and unit costs when production is performed on the basis of successive "runs" of different products at scheduled periods of time.

19. How is it possible to process two or more products simultaneously in the same process and compute a satisfactory unit cost for each type of product? Explain.

20. Under what circumstances is it advantageous and practical to use the weighted average cost method to determine unit costs? What are the shortcomings and criticisms of the weighted average cost method?

Problem 1

The Noble Manufacturing Co. submitted the following information for the month of April:

Costs	Process 1	Process 2	Total
Materials..................................	$3,250	$ 500	$ 3,750
Labor......................................	2,600	2,500	5,100
Factory overhead..........................	1,625	1,000	2,625
Total costs put into process................	$7,475	$4,000	$11,475
Units completed and transferred..............	6,000	6,000	

Entries have been made during the month to record the purchase of materials, the vouchering of the payroll, and the recording of the factory overhead.

Prepare journal entries to record the following transactions:

a. To charge Processes 1 and 2 for materials used.
b. To charge Processes 1 and 2 for labor costs.
c. To charge Processes 1 and 2 for factory overhead costs.
d. To transfer the completed units from Process 1 to Process 2.
e. To transfer the completed units ready for sale to finished goods.

Problem 2

The Barry Manufacturing Co. manufactures a single product in a single process. Production is scheduled so that there are no opening or ending work in process inventories. Material requisitions, payroll sheets, and overhead analysis sheets show the following costs charged to production for the month of July:

Direct materials............	$72,000
Direct labor.................	54,000
Factory overhead...........	36,000

Production records show that 37,050 units were started and that 36,000 units were completed during the month. Shrinkage of 1,050 units was considered to be a normal operating condition.

a. Prepare a cost analysis statement for the month of July.
b. Using the process cost analysis statement, prepare summary journal entries for the month.

Problem 3

The Unico Manufacturing Co. produces one product by passing the material through two processes. The production passes directly from Process 1 to Process 2. The inventories of work within the processes must be considered, because the cost of the material is relatively high and the amount of material within each process varies greatly from time to time. The following information is available for the month of January.

Process 1 contained no inventory on Jan. 1. During the month 800 units costing $8,000 were put into the process; and upon this material, operations representing labor and overhead were costed at $2,800. During the month, 600 units were finished and transferred to Process 2. On Jan. 31, 200 units remained in Process 1, one-half finished. The material was added at the beginning of the process.

Process 2 contained no inventory on Jan. 1. During January, it received the work finished by Process 1. The costs of operations of Process 2 were $2,000 and material costs were $1,000. During the month Process 2 completed 300 units. On Jan. 31, 300 units remained within the process, one-third finished. In Process 2, all the material was put into production at the end of the operation.

a. Prepare a cost analysis statement for the month of January.
b. Using the process cost analysis statement, prepare summary journal entries for the month of January.

Problem 4

The Harris Manufacturing Co. began operations, Sept. 1, with no opening inventories of material, work in process, or finished stock. The company fabricates a single product in two separate processes which are designated as Processes 1 and 2.

During the month of September materials were purchased in the amount of $10,000, payrolls totaled $3,500, and factory overhead amounted to $1,300. Material requisitions show that 1,600 units of material costing $8,000 were used in Process 1; no material was requisitioned by Process 2. An analysis of payrolls indicates that $2,000 is assignable to Process 1 and $1,500 to Process 2. Factory overhead costs are allocated to processes directly and through the media of distribution bases as follows: Process 1, $800; Process 2, $500.

During the month, 1,200 of the 1,600 units processed in Process 1 were completed and transferred to Process 2, while 400 units remained in Process 1, one-half completed as to labor and factory overhead. In Process 1 all materials are used at the beginning of the process.

Process 2 received the 1,200 units completed in Process 1 and completed 600 units which were transferred to finished goods. The 600 units which remained in Process 2 on Sept. 30 as work in process are estimated to be one-third finished as to labor and factory overhead.

a. Prepare a cost analysis statement, showing the detailed costs per unit for each process, the accumulated unit and total cost for each process and finished goods, and the value of the inventories.

b. Prepare journal entries for September.

Problem 5

The following information is given for Process 1 for the Banner Manufacturing Co. The average method of pricing work in process inventories is used.

Beginning inventory, Jan. 1:

Materials, 500 units	$ 900
Labor, 500 units	1,000
Factory overhead, 500 units	400
Total beginning inventory	$2,300
Production costs for January:	
Materials	$ 7,360
Labor	11,520
Factory overhead	5,040
Total costs for January	$23,920

Production completed during January:

500 units from Jan. 1 inventory.
2,000 units from products received during January.
2,500 total units completed.

Inventory, Jan. 31: 400 units, 25% completed as to material, labor, and overhead.

a. Prepare a cost analysis statement showing unit costs for material, labor, and overhead for January.

b. Prepare a schedule of work in process inventory, Jan. 31.

c. Prepare journal entries to record all costs and to transfer completed work to Process 2.

Problem 6

Howerton Compressors, Inc. manufactures a single standard product in a single process. The production cycle is planned so that there are beginning and ending work in process inventories. A cost analysis is prepared bimonthly. The management follows strictly the average method of determining unit costs; therefore, any beginning work in process inventory is averaged in with the current costs for the purpose of determining unit cost for the current period.

Production records for the 2-month period ended Nov. 30 show that there were 2,000 units, partially completed, in the work in process inventory of Oct. 1; that 16,000 additional units were received in process during the period, and that there were 1,000 units left in process at the end of the period, estimated to be 80% complete as to materials and 30% complete as to labor and factory overhead.

The cost records contain the following data:

Costs	Work in process Oct. 1	Costs put in during period
Direct materials	$40,000	$351,600
Direct labor	80,000	577,400
Factory overhead	33,000	259,500

a. Prepare a cost analysis statement for the 2-month period ended Nov. 30.

b. Using the cost analysis statement, prepare summary journal entries for the bimonthly period.

Problem 7

The National Manufacturing Co. in producing article Z has a process cost accounting system but operates as a single process. The cost records are kept on a monthly basis, and the first-in, first-out method of pricing work in process inventories is used.

On June 1, a statement of inventories shows:

Work in process:	
Materials, 400 units 40% completed @ $2	$320
Labor, 400 units 40% completed @ $3	480
Overhead, 400 units 40% completed @ $0.50	80

Purchases of raw materials and operating costs for June are as follows:

Materials	$6,000
Labor	8,448
Factory overhead	1,584

Requisitions show that $5,460 in materials have been issued from the stockroom to the production department.

The production report for the month shows that 2,500 units of article Z, including the beginning inventory, were completed and transferred to finished goods during the period.

On June 30 there are 500 units in process, averaging 60% completed as to labor and factory overhead, but 80% completed as to material.

Required:

a. Cost analysis statement exhibiting unit costs, total costs, and inventory valuations for June.

b. Journal entries for the month of June.

Problem 8

The Browne Manufacturing Co. produces a single product in a single process. Cost reports are prepared monthly. The production cycle is planned so that there are beginning and ending work in process inventories. The company follows the policy of pricing beginning and ending inventories by the first-in, first-out method of determining cost.

Production and cost records for the month of July contain the following information:

Work in process inventory July 1, 20,000 units estimated to be 40% completed and valued at $8,800. Work in process inventory July 31, 30,000 units estimated to be 30% completed as to material, labor, and factory overhead. During the month, in addition to the 20,000 units in the beginning inventory, 90,000 units were received in process, making a total of 110,000 units. Units completed and transferred to finished stock totaled 80,000. During the month direct materials requisitioned were valued at $20,250, the payroll analysis showed direct labor of $64,800, and factory overhead amounted to $8,100.

a. Prepare a cost analysis statement for the month of July.

b. Using the cost analysis statement, prepare summary journal entries for the month of July.

Problem 9

The Smything Co. manufactures a standard automotive part in two processes, identified as Milling and Finishing. A quarterly cost analysis is prepared. At the beginning of the second quarter of the current year there was no work in process inventory, but at the close of the second quarter there was a work in process inventory. The production method requires that all direct materials be put into process immediately at the beginning of the milling process. No other direct materials are added until the end of the finishing process when the part is packaged.

Production and cost records show the following for the Milling Process during the second quarter of the current year:

Units received in process	200,000
Units completed and transferred	150,000
Units remaining in process	50.000
(Units remaining in process 100% completed for materials and estimated to be 60% complete as to labor and factory overhead)	
Direct materials cost	$44,000
Direct labor cost	66,600
Factory overhead cost	32,400

Production and cost records for the Finishing Process contained the following information for the second quarter of the current year:

Units received in process	150,000
Units completed and transferred	130,000
Units spoiled owing to normal operating conditions	400
Units remaining in process	19,600
(Units remaining in process estimated to be 40% complete as to labor and factory overhead. No materials have been added to these units.)	
Direct materials cost	$23,400
Direct labor cost	13,784
Factory overhead cost	6,892

a. Prepare a cost analysis statement for the second quarter of the current year.

b. Using the cost analysis statement, prepare summary journal entries for the second quarter.

c. Using the cost analysis statement, prepare a formal work in process inventory statement.

Problem 10

The Pacific Manufacturing Co. produces one product by passing the material through two processes. The production passes directly from Process 1 to Process 2. The inventories of work within the processes must be considered because the cost of the material is relatively high and the amount of material within each process varies greatly from time to time. The following information is available for the month of January:

Process 1 contained no work on Jan 1. During the month, 800 units of material costing $8,000 were put into the process; and upon this material labor and factory overhead costs were $2,800. During the month, 600 units were finished and passed on to Process 2. On Jan. 31, 200 units remained in Process 1, one-half finished as to material, labor, and factory overhead.

Process 2 contained no inventory on Jan. 1. During January, it received the work finished by Process 1. The costs of labor and factory overhead in Process 2 were $2,000. During the month, Process 2 completed 200 units. On Jan. 31, 300 units remained within the process, one-third finished. Of the loss of 100 units, 80 units are considered *to be an abnormal loss chargeable to a special inefficiency* or loss account. At the time of loss the 80 units were one-half finished as to labor and factory overhead.

a. Prepare a cost analysis statement, showing the detailed cost per unit for each process, the accumulated unit and total cost for each process and finished goods, and the value of the inventories.

b. Prepare journal entries for January.

Problem 11

The Kanza Manufacturing Co. began operations on Jan. 1, with no opening inventories of materials, work in process, or finished goods. The company uses process cost accounting in costing its single product, which is manufactured in two separate processes, designated as Process 1 and Process 2.

During the month of January materials were purchased for $10,000; payrolls paid totaled $6,000; and factory overhead costs amounted to $4,000. The costs were distributed to the two processes as follows: Process 1: materials, $4,000; labor, $2,500; overhead, $1,500; Process 2: materials, $6,000; labor, $3,500; overhead, $2,500.

During the month 4,000 units were processed in Process 1; 2,000 were completed and transferred to Process 2; and 2,000 remained in Process 1 on Jan. 31. It was estimated that the units remaining in process were one-fourth completed as to material, labor, and overhead costs.

In Process 2 all materials are applied to production in a final assembly at the moment the units are completed and ready for transfer to finished goods. Process 2 production schedules contain the following data for the month:

Units completed and transferred to finished stock, 1,100.

Units remaining incompleted in Process 2, estimated to be one-half completed as to labor and overhead costs, 800.

Units spoiled, with no scrap value, at the beginning of the process due to normal conditions of operation, 20.

Units stolen after being fully completed, but before being transferred to finished stock, 80 (considered to be an abnormal loss chargeable to a special loss account).

a. Prepare a cost analysis statement showing the detailed cost per unit, the accumulated unit cost, and the total cost for each process and finished goods.

b. Prepare journal entries for January.

c. Using the cost analysis statement, prepare a formal work in process inventory statement.

Problem 12

The Hughes Chemical Co. produces commercial chemicals. On one of its production lines several products are processed separately by "successive runs." During June two chemicals, identified as A and B, were produced. The production report for the month shows the following information:

	Chemical A	Chemical B
Direct materials	$18,000	$ 9,000
Direct labor	$12,000	$15,000
Units started and completed	36,000	30,000
Hours of production	120	60

Total plant overhead allocated to this production line for the month, $9,000. Overhead is allocated to each successive run based upon the number of hours each product uses the production line.

a. Prepare a cost analysis statement for the month of June showing the cost per unit for each chemical for direct materials, direct labor, and factory overhead.

b. Prepare journal entries to record all transactions for the month, assuming that there is a separate work in process account for each product.

Problem 13

The Viner Canning Co. is a small packing concern that processes vegetables throughout the year. As the company has only one production line, it is necessary to pack each product separately by "successive runs." After operating a number of days in packing one product, the equipment is prepared for the next one. The setup costs are charged to the next product to be canned.

The company's production report for August shows the following information:

Products	Hours of plant use for production	Production of No. 2 cans
Beets	60	100,000
Corn	110	150,000
Hominy	130	200,000

The following transactions occurred during August:

1. Total cost of vegetables purchased on account, $12,000; requisitions show the following classification of vegetables processed: beets, $2,500; corn, $3,000; and hominy, $3,500.

2. Cans and lids purchased on account and consumed during the month total, $9,500. They are allocated to products on the basis of the number of cans processed during each "run."

3. Labor costs vouchered and paid total $25,000; withholdings: F.I.C.A. tax, $350; income tax, $2,200. Labor costs are classified by means of daily time reports as follows: beets, $6,500; corn, $7,500; hominy, $9,000; indirect labor, which includes clerical help, janitor's wages, and manager's salary, totals $2,000.

4. Additional plant overhead costs vouchered and paid: rent, $600; utilities, $180; maintenance and repairs, $90.

5. Other overhead costs recorded by means of adjusting entries include depreciation of machinery and equipment, $200; payroll taxes, $900; property taxes accrued, $60; insurance expired, $30.

6. It is the policy of the company to allocate plant overhead costs to products on the basis of the number of hours used in plant production.

a. Submit a cost statement for August showing an analysis of costs and the cost per can for each product for each major classification of cost: materials, direct labor, and factory overhead.

b. Prepare journal entries to record all transactions for the month, assuming that there is a separate work in process account and finished goods account for each product.

Problem 14

The Templar Co. produces two types of cleaning solvent identified as M and N. Both types are produced simultaneously in the first process, but in the succeeding processes are costed separately. In Process I the following weights show the cost relationship of the two items: M, 5 points; N, 1 point. The total costs for Process I for April are as follows:

Direct materials	$27,000
Direct labor	36,000
Factory overhead	9,000

Gallons produced during April:

Solvent M	36,000
Solvent N	30,000

There were no beginning or ending work in process inventories.

a. Prepare a statement of weighted average production for products M and N for Process I for the month of April.

b. Prepare a cost analysis statement for the month showing the cost per unit for direct material, direct labor, and factory overhead for Process I.

c. Prepare journal entries to record the transaction for Process I for April.

Problem 15

The Roberts Co. produces building bricks and firebricks. Each type of brick is put through two main processes, designated as forming and heat-treating. The company does not compute separate costs for each run of bricks but maintains separate costs for each process. The following weights indicate the cost relationships of each product.

Type of brick	Forming, points	Heat-treating, points
Building	3	2
Fire	2	5

The total cost for each process for May is as follows:

Forming	$10,600
Heat-treating	24,400

The production of bricks for May is as follows:

Type	Units
Building	260,000
Fire	140,000

a. Prepare a statement of weighted average production of bricks by type and processes for May.

b. Submit a cost analysis statement, showing total and unit costs by operations for each type of brick for the month of May.

Problem 16

The Hall Baking Co. maintains separate costs for each of the following divisions: cookies, cakes, pies, and bread. Assume that you are in charge of the cookie department which is subdivided into mixing, baking, and packaging operations. The cookies can be divided conveniently into three types, coded A, B, and C. It is not practical to compute separate costs for each batch of cookies. The cost computations are further complicated by the fact that at any time two or more types of cookies may be processed simultaneously.

After a complete analysis of costs has been made for each type of cookies in each operation, based upon a series of test runs, the following weights, indicating cost relationships of each product, have been agreed upon:

Type of cookie	Mixing, points	Baking, points	Packaging, points
A	4	1	2
B	4	2	3
C	6	2	3

The total costs of the cookie department for January are as follows:

Mixing	$1,800
Baking	600
Packaging	1,200
Total	$3.600

The production of cookies for January is given below:

Type	Dozen
A	12,000
B	14,000
C	10,000

a. Prepare a statement of weighted average production of cookies by type and operations for January.

b. Submit a cost statement, or separate statements, showing costs per dozen by operations for each type of cookie for January.

CHAPTER XIII

Questions

1. What advantages accrue from the use of operations as costing units in place of larger spheres of production activities, such as processes or departments?

2. What factors are considered in selecting operations as cost centers?

3. Why is it advantageous to management to accumulate costs for service departments as well as for operations?

4. Explain the purposes and advantages of employing a system of budgetary control in connection with an operation cost accounting system.

5. What are the advantages of using normal, predetermined, overhead rates in process and operation cost systems?

6. Explain in detail how normal, predetermined, overhead rates are computed for processes or operations. Give three formulas for such rates.

7. Describe in detail, or illustrate by means of a diagram, a plan of cost accounting which includes operation costs, service department costs, a system of budgetary control, and normal, predetermined, overhead rates.

8. Explain how costs are transferred from operations to finished goods, how work in process inventories are determined, and how unit costs are computed.

9. Summarize the benefits that management may expect from a system of process or operation cost accounting.

10. What are the weaknesses of process and operation cost accounting from the point of view of management.

Problem 1

The Nalley Co. processes a single product in a single process and uses a predetermined normal overhead application rate to add overhead costs to its production. The following information is available for the month of January:

Direct material cost	$10,000
Direct labor cost	$15,000
Direct labor-hours	10,000
Factory overhead rate	$0.50 per labor-hour
Factory overhead costs	$ 7,000

Work in process inventory	Jan. 1	Jan. 31
Materials	$ 1,500	$ 2,000
Labor	1,000	1,500
Factory overhead	1,200	1,800
Total	$ 3,700	$ 5,300
Finished goods inventory	$10,000	$13,750

a. Prepare journal entries for the month of January, including the entry to set up the Factory Overhead Variance account.

b. Assuming that the variance is due to one or more of the following causes, explain what disposition should be made of the variance in each case:

(1) Incorrect overhead application rate?
(2) Seasonal conditions?
(3) Abnormal causes?

Problem 2

The Carrol Manufacturing Corp. uses a process cost system. Manufacturing overhead costs are applied to the product by a predetermined normal overhead application rate of 50% of the direct labor cost and are credited to the Applied Factory Overhead account. The books were closed as of Dec. 31, when the inventory of goods in process in Process A consisted of 1,000 units of product as follows:

Direct material cost	$10,000
Direct labor cost	4,000
Overhead cost	2,000
Total	$16,000

During January, 10,000 additional units were started; materials were issued at a cost of $60,000; direct labor amounted to $50,000; overhead cost was applied at 50% of the direct labor cost; 9,000 units were completed and transferred to the next process; 2,000 units remained in process on Jan. 31 with all material added and labor and overhead averaging 50% completed. The company uses the average method of valuing beginning work in process inventories.

a. Prepare a cost analysis statement for January.

b. Prepare journal entries for January.

Problem 3

The Rath Manufacturing Co. began operations on Apr. 1 with no opening inventories. The company uses process cost accounting in costing its single product, which is manufactured in two separate processes, designated as Process 1 and Process 2.

During April materials were purchased for $30,000; payrolls paid totaled $12,480; and factory overhead costs amounted to $8,000. Actual costs were distributed as follows: Process 1: material, $6,000; labor, $6,000; overhead, $3,000; Process 2: material, $6,000; labor, $6,480; overhead, $5,000.

The company uses predetermined normal overhead rates as follows:

Process 1, 90% of direct labor cost.

Process 2, 50% of direct labor cost.

During the month 8,000 units were processed in Process 1; 4,000 units were completed and transferred to Process 2, and 4,000 units remained in Process 1 on Apr. 30. It was estimated that those remaining in process were one-fourth completed as to material, labor, and overhead costs.

In Process 2 all materials are applied to production in a final assembly at the moment the units are completed and ready for transfer to finished goods. Process 2 production schedules show the following data for the month:

Units completed and transferred to finished stock, 2,600.

Units remaining incompleted in Process 2, estimated to be one-half completed as to labor and overhead costs, 1,200.

Units spoiled, with no scrap value, at the beginning of the process owing to normal conditions, 160.

Units lost after all material, labor, and overhead have been added, 40 (considered to be an abnormal condition).

a. Prepare a cost analysis statement showing the detailed costs per unit for each process, the accumulated unit and total costs for each process and finished goods.

b. Prepare journal entries for April, including entries to set up overhead variance accounts for each process.

Problem 4

The Walton Fabricating Co. began operations on Jan. 1 with no opening inventories. The company uses process cost accounting in costing its single product, which is manufactured in two separate processes, designated as Process I and Process II.

During January materials were purchased for $17,221, payrolls were paid totaling $8,775, and factory overhead costs amounted to $5,887. These costs were distributed to the two processes as follows: Process I: material cost, $8,000; labor cost, $5,000; and factory overhead cost, $3,971; Process II: material cost, $3,475; labor cost, $3,775; and factory overhead cost, $1,916. The company uses a normal predetermined overhead application rate. The rate for Process I is 80% of the direct labor costs and for Process II, 50% of the direct labor costs.

During the month 12,000 units were processed in Process I; 7,900 units were completed and transferred to Process II; 100 units were stolen after completion in Process I, but before transfer to Process II. The loss due to theft is considered to be an abnormal condition chargeable to a special loss account. (Process I should be credited for the accumulated cost of the units stolen.) There were 4,000 units remaining in Process I on Jan. 31, and it was estimated that they were one-half completed as to material, labor, and overhead cost.

In Process II, all material costs are applied to production in a final assembly operation at the moment the units are completed and ready for transfer to finished goods. Production schedules for January show the following data for Process II:

Units completed and transferred to finished stock, 6,950.

Units remained incompleted in process, estimated to be two-thirds completed as to labor and overhead costs, 900.

Units spoiled with no scrap value at the beginning of the process, owing to poor materials, 50 (considered a normal operating condition).

a. Prepare a cost analysis statement showing the detailed costs per unit for each process, the accumulated unit and total cost for each process and finished goods.

b. Prepare journal entries for January, including entries to set up overhead variance accounts for each process.

Problem 5

The Bush Co. manufactures three types of small roller bearings, coded as X, Y, and Z. The company is departmentalized with three service departments: personnel, inspection, and administration, and four operations: cutting, grinding, sizing, and finishing. The flow of production is as follows:

Product X is processed in the cutting and finishing operations.

Product Y is processed in the cutting and sizing operations.

Product Z is processed in cutting, grinding, and finishing operations.

The company uses a predetermined normal overhead application rate, based on direct labor-hours, to cost its monthly production. The annual budget gives the following information:

Operation	Estimated factory overhead	Estimated direct labor-hours
Cutting	$ 5,040	8,400
Grinding	6,000	6,000
Sizing	10,800	3,600
Finishing	10,080	14,400

Production records for May show the following units completed: product X, 7,500; product Y, 5,000; and product Z, 3,500. There were no beginning or ending inventories.

A survey of service departments and operations discloses the following information:

Dept. or operation	No. of employees	Cost of equipment	Floor space, sq. ft.		Cost of materials requisitioned	Payroll costs (May)
Personnel	2	$ 2,000	(10%)	460	$ 90	$ 800
Inspection	5	4,000	(5%)	230	125	900
Administration	4	5,000	(7.5%)	345	85	1,000
Cutting	10	15,000	(15%)	690	12,500	1,450
Grinding	15	24,000	(20%)	920	650	1,500
Sizing	4	30,000	(10.5%)	483	300	1,000
Finishing	10	20,000	(32%)	1,472	500	2,400
Totals	50	$100,000		4,600	$14,250	$9,050

Production records for May show the following direct labor-hours for each department: cutting, 800; grinding, 600; sizing, 400; and finishing, 900.

Plant overhead costs for May and the allocation bases used in the annual budget are given below:

	Allocation base	Overhead cost
Depreciation.............	2% per month of cost of equipment	$2,000
Utilities................	Floor space	200
Insurance...............	Cost of equipment	90
Taxes...................	Cost of equipment	150
Repairs.................	Cutting, 10%; sizing, 15%; grinding, 25%; finishing, 50%	350
Compensation insurance..	Number of employees	76
Spoiled work............	Sizing, 60%; finishing, 40%	200
Telephone and telegraph..	Administration, 75%; personnel, 25%	24

Payroll taxes of $304 are distributed as follows: personnel, $32; inspection, $18; administration, $40; cutting, $18; grinding, $60; sizing, $40; and finishing, $90. Service departments' costs are distributed to operations as follows: personnel, number of employees; administration, equally; and inspection: cutting, 10%; grinding, 10%; sizing, 30%; and finishing, 50%.

All variances are considered to be due to seasonal conditions.

a. Compute the predetermined normal overhead application rate for each operation.

b. Prepare a cost analysis statement showing the unit cost for material, labor, and applied overhead for each operation.

c. Prepare a statement showing the average cost per unit for each product.

d. Prepare a statement showing the apportionment of actual overhead costs to service departments and to operations and a comparison with applied overhead for each operation.

Problem 6

The Superior Hammer Company produces an expensive line of hammers. It operates its own handle department and a foundry department to produce the hammer heads. Assembly and finishing is a separate department.

In the foundry department, equal parts, by weight, of pig iron and coke, together with special alloy materials, are introduced into a furnace where the materials are reduced to molten metal which is poured into molds. The day's work in the foundry is as follows:

1. Remove and clean the heads cast on the previous day.
2. Set the molds for the current day's melt.
3. Load and "burn" the melt for the day.
4. Pour the metal into the molds.

One-fourth of the labor cost is estimated to be applicable to step number 1.

In the Assembly and finishing department, the hammer heads are finished and the handles inserted. Handles are frequently spoiled in the process. Finished hammers are transferred to the stock room immediately.

On October 1, 1952 there was no inventory of any kind in the foundry department. During October, 20,000 heads were completed and transferred to the assembly and finishing department. At the end of the month 1,500 good cleaned heads were on hand in the foundry and 1,000 heads had been poured on the last day. A total of 22 tons of pig iron, coke and alloy materials costing $1,248 were placed in production. Direct labor costs for the month amounted to $4,380. Indirect costs were applied at

30% of direct labor cost. A hammer head weighs one pound. An average of ten per cent of the heads poured are not perfect and are remelted.

On October 1 there were 400 hammer heads in the assembly and finishing department on which no work had been done. Their cost was $128.24. There were no handles on hand. During October 20,000 handles costing $9,876 were received in this department. All of the handles were used in completing 19,800 finished hammers. Labor cost amounted to $1,834 and indirect costs to $1.252.

Required:

Prepare departmental cost and production reports showing unit production costs and the assignment of these costs to interdepartmental transfers or inventories for the month of October 1952 for the foundry department and the assembly and finishing department. The company uses weighted average cost in its accounts. Unit cost computations should be carried to five decimal places.

(Uniform Certified Public Accountant Examination, November, 1952)

Problem 7

The P.A.R. Company, which is engaged in manufacturing a single product, uses a process cost system to cost its product and to determine inventory values.

You are to prepare a summary of costs and production for October 1949, and a summary schedule of inventory values by departments at October 31, 1949. In costing units out of each department, use the first-in-first-out basis.

The production of the company is carried on in two production departments identified as departments 1 and 2. However, while overhead is allocated to department 1 in total and is applied on a labor dollar basis to production of the department, the cost of direct labor is accumulated for each of two separate processes performed within the department, which processes are identified as A and B. Material is used at various stages of production as follows: Material L is placed in process at the beginning of work in department 1 (*i.e.*—at the beginning of process A); material T is put into the process at the beginning of the second process (process B) in department 1; no material is added in department 2. When the production of process A reaches process B, it is mixed with material T.

Costing of production is on a pound basis in department 1, but on a unit basis in department 2. A unit has a weight of 80 pounds at the start of processing in department 2. There is a weight loss in department 1, all of which takes place in the second (B) process. There is a normal loss of units in department 2 due to units being found to be defective upon final inspection in the department. These defective units have no salvage value.

The following data cover the operations for the month of October 1949:

Department 1

	Work in process 10/1/49 (pounds)	Work in process 10/31/49 (pounds)	Transferred to Department 2 (pounds)
Process A	2,000	3,000	—
Process B	4,000	2,000	36,000

During October, 25,000 pounds of material L costing $4,250 were issued to process A, and 12,000 pounds of material T costing $2,720 were issued to process B.

Labor cost during October for process A was $13,832 and for process B was $14,878. Overhead is 100% of labor cost. Work on the inventory in process A as of October 1, 1949 had been 40% completed. The cost of material, labor and overhead had amounted to $1,284. The inventory in process B had been 60% completed in that process and had an accumulated total cost of $5,384. The inventories on October 31, 1949 were 50% complete in both processes.

Department 2

In department 2 there were 250 units in process on October 1, 1949, which were estimated to be 50% completed. Their accumulated cost was $70,001.20. During the month the cost of labor was $53,560 and overhead was applied at 150% of labor cost. During October, 500 good units were completed, of which 400 were transferred to finished goods stores. There are 160 unfinished units in the department on October 31, 1949 which are 5/8 complete as to this department.

(Uniform Certified Public Accountant Examination, November, 1949)

CHAPTER XIV

Questions

1. Differentiate between industries producing joint cost products and those producing by-products. Give two illustrations of joint products and two illustrations of by-products.

2. A large retail self-service grocery store has 10 separate departments. The management is in the process of developing an accounting system that will provide accounting data each month to show sales, costs, and profit or loss by departments and lines of products. List several joint costs not applicable to a particular department or line of products and explain how the existence of such common costs complicate and limit the use of accounting data in making decisions in this type of retail establishment.

3. What are the important problems involved in accounting for joint costs?

4. Explain and illustrate the market price method of allocating joint costs to products. What variations can be made in the application of this method?

5. What is the unit method of apportioning joint costs to products? What are the common units used in the computation of costs? How is a shrinkage in the number of units or loss of volume treated when the unit method is used?

6. Why is the survey method considered more equitable than either the market price method or the unit method?

7. What problems are involved in accounting for by-products?

8. Explain three methods of accounting for by-products.

9. A furniture manufacturer has organized a special department to make toys from short lengths of hardwoods which were being disposed of as waste. Discuss this concern's cost problems from the standpoint of whether joint products or by-products are involved. Describe two methods of determining the cost at which the short lengths of hardwoods should be transferred from the furniture department to the toy department. Which method would you recommend and for what reason?

Problem 1

The production records of the Southern Lumber Co. exhibit the following data for the year:

Grades	Quantity produced, ft.	Selling price, per ft.
First and second	500,000	$0.08
No. 1 common	2,500,000	0.06
No. 2 common	1,000,000	0.04
No. 3 common	1,000,000	0.03

Total costs of producing these joint products were $215,000.

a. Determine the unit cost by the market price method of allocating joint costs.
b. Do the same as required in *a*, using the unit method of allocating joint costs.

Problem 2

The Betty Ann Dress Co. manufactures inexpensive street and house dresses, of both seasonal and standard pattern. Dress models are designed by the planning department and are manufactured in lots of 50 doz., a production order being used to accumulate costs for each lot. The production manager is concerned about determining unit costs for each order, because approximately 10% of the dresses in each order are classed as "seconds" and 2% are considered as "rejects" by inspectors.

Production order 1060 may be considered typical of production conditions. The order schedules production of 50 doz. Model X dresses, for which the following costs are accumulated: direct material, $660; direct labor, $480; and factory overhead, $240. Sixty dresses were classed as seconds and 12 dresses as rejects by inspectors. The first-line dresses sell to jobbers for $60 per dozen; the seconds sell for $36 a dozen; and rejects are valuable only as scrap material at a value of approximately $2 a dozen.

These conditions are considered normal by the management, but the company is periodically faced with labor troubles, during which inexperienced cutters and sewers are used. During these temporary periods, seconds frequently amount to 30% and rejects to as high as 10% of the total production.

You are asked to advise the management on the following:

a. How the unit cost of first, seconds, and rejects should be determined so that the profit for each order and for each class of products can be computed.

b. How costs for each order and for each class of products should be determined during abnormal conditions of production caused by strikes.

Problem 3

The Wright Products Co. produces four products under joint cost conditions. The following results have been estimated for each ton of raw material processed:

Finished product	Production, lb.	Selling price per lb. of recovered product
A	400	$0.14
B	850	0.03
C	500	0.009
D	100	0.06

Direct labor per ton to point of split-off, $4.

Overhead cost per ton to point of split-off, $8.

Costs to be added to material cost per ton for handling and for commissions paid dealers who collect and transport the raw materials to the plant, $10.

Selling and administrative costs, 8% of sales.

Total net profit desired, 6% of total sales.

The 150 lb. of raw material not accounted for in production are losses from sand, trash, moisture, and manufacturing operations. They are to be distributed to the recovered products.

a. Compute the maximum price that the purchasing department may pay for each ton of raw material.

b. Using the price determined in *a*, prepare a comparative statement of estimated profit by products for each ton of raw material put into production, using the market price method of allocating manufacturing costs to products.

c. Do the same as required in *b*, using the unit method of apportioning manufacturing costs to products.

Problem 4

The Country Club Real Estate Co. purchased a tract of land for the purpose of subdividing the area into lots to be sold for home sites. The lots are numbered, and the selling price is established as follows:

Lot No.	Selling price	Lot No.	Selling price
1	$6,000	8	$7,500
2	6,500	9	5,500
3	5,500	10	4,000
4	5,000	11	4,000
5	5,000	12	4,000
6	4,500	13	3,500
7	6,000	14	3,000
Total selling price..............			$70,000

The company has adopted the policy of closing its books and computing profits each year. The total cost of developing the subdivision is given in the schedule below:

Purchase price......................	$30,000
Improvements:	
Grading and landscaping...........	2,000
Sewers...........................	4,000
Paving...........................	3,000
Water lines.......................	5,000
Supervision cost....................	6,000
Total cost......	$50,000

During the year lots 1, 5, 11, and 13 were sold.

a. Prepare a comparative profit and loss statement as of Dec. 31 exhibiting the costs (classified as to purchase of land, improvements, and supervision), the selling price, and the profit on each lot sold.

b. Explain how you would compute the inventory value of the remaining lots.

Problem 5

From the information below, prepare the following statements, supported by whatever explanatory schedules you consider necessary:

(a) statement to show at what list price and at what net price per pound Yip should be sold;

(b) statement to show at what list price and at what net price per gallon Zip should be sold;

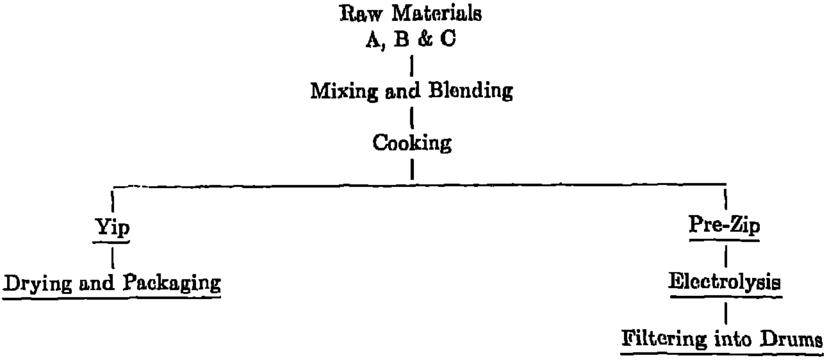
(c) condensed income statement to show, separately and combined, the results of operations in Yip and Zip, on the assumption that the entire quantity of each product manufactured will be sold at the respective prices indicated in the statements prepared in (a) and (b), above, and that selling, administrative and general expenses are to be included at the same estimate as is allowed in setting such prices.

Chemco, Inc. has perfected a process for producing from the three raw materials, A, B and C, two chemical compounds, Yip and Zip.

The raw materials are required in the following proportions by weight:

A	3 parts
B	5 parts
C	2 parts
	10 parts

The following diagram illustrates the manufacturing process:



One hundred thousand (100,000) pounds of raw material will be processed. The unit costs of the three raw materials are as follows:

A	$ 2.00 per pound
B	50.00 per ton
C	4.00 per gallon

Other costs of production are estimated to be:

Mixing, blending and cooking	$16,090
Additional costs applicable to Yip:	
Drying and packaging	4,660
Additional costs applicable to Zip:	
Electrolysis and filtering to drums	6,920

The cooking process reduces the weight of the combined raw materials by 40 per cent.

Out of 100,000 pounds of original raw materials, 20,000 pounds of pre-Zip are obtained. Of the pre-Zip electrolyzed 25% becomes a non-marketable precipitate, the remainder, a liquid, being filtered into 50-gallon drums without further attention.

The cost of drums, which are returnable and for which customers are to be charged specifically, is not to be included in either the cost or the price of Zip.

Each product is to be sold on the basis of a list price, less 35% and 10%. Of the net selling price of each product, 25% is to be allowed for selling, administrative and general expenses, (including provision for income tax), and 20% for net profit after provision for all costs and expenses.

The company has never marketed either of the products, but has demonstrated the existence of markets for both if they can be manufactured to sell at suitable prices. Its experience in producing both these and other chemicals leads it to believe that the above estimates of cost relative to the processing of 100,000 pounds of the three raw materials combined are reliable as a basis for setting a price for each of the products to be manufactured therefrom.

Note: One gallon of Zip weighs 7.5 pounds.
One gallon of Raw Material C weighs 8 pounds.
(Uniform Certified Public Accountant Examination, November, 1947)

Problem 6

The Clum Sash and Door Co. sold scrap milling during the year for a total of $8,500 to the Hobby Co. There were no distribution or administrative costs in connection with the sale of scrap, inasmuch as the Hobby Co. came to the plant, weighed the scrap, and hauled it away. The Clum Co. started the year with an opening inventory of $78,000, produced goods costing $567,000, and had an ending inventory of $56,000. Sales for the year, exclusive of scrap, were $700,000. Distribution costs were $60,000, and administrative costs totaled $40,000.

a. Prepare a profit and loss statement, assuming that by-product revenue is considered as other income.

b. Prepare a profit and loss statement, assuming that by-product revenue is considered to be a reduction in the cost of manufacturing the major commodities, which are considered to be sashes and doors.

Problem 7

The Turner Co. manufactures one major product, called Mark-I, in a single process. During the process impurities settle to the bottom of the production vats. When the vats are cleaned, the impurities are recovered and sold as a by-product called X-S. During the year the company produced and sold 100,000 units of Mark-I at $1 per unit. Total costs of manufacturing were direct material, $30,000; direct labor, $20,000; and factory overhead, $8,000. Distribution costs were $12,000, including marketing of X-S, and administrative costs totaled $10,000. There were no beginning or ending inventories, and the X-S revenue for the year was $2,000. A survey indicated that the distribution costs associated with marketing the X-S totaled $200.

a. Determine the unit cost of Mark-I, using three different methods of accounting for the by-product.

b. Prepare a profit and loss statement for each of the three methods of accounting for by-products given in *a.*

Problem 8

The Boylston Manufacturing Company made $70,000 gross profit in 1940 and $37,000 in 1941, and wants to know what has caused the decline of $33,000. The following information was given by the company:

Net sales	1940	1941
Product A	$100,000	$120,000
B	50,000	40,000
C	25,000	25,000
Together	$175,000	$185,000
Cost of goods sold	105,000	148,000
Gross profit	$ 70,000	$ 37,000

The quantity and quality of raw materials entering into each unit of product have remained unchanged throughout the two years.

No inventories were on hand at the beginning or end of either year.

Scrap from the fabrication of Products A and B is the raw material for Product C. Product C has been treated as a by-product and the cost of raw material entering into it has been regarded as an amount equal to its selling price less the direct labor expanded in making it a marketable product. This "cost" has been credited ⅘ and ⅕, respectively, to the material costs of Products A and B, for the reason that the proportion of scrap material from the fabrication of the two major products has been 4 to 1.

Upon analysis of the books the following cost data were extracted from the production accounts:

Cost of production in 1940:

	Units	Material	Labor	Overhead	Together
Product A.........	500	$40,000	$10,000	$10,000	$ 60,000
B.........	2,500	10,000	5,000	5,000	20,000
C.........	1,000	16,000	9,000		25,000
Together.........		$66,000	$24,000	$15,000	$105,000

Cost of production in 1941:

	Units	Material	Labor	Overhead	Together
Product A.........	600	$60,000	$15,000	$15,000	$ 90,000
B.........	1,600	13,000	10,000	10,000	33,000
C.........	1,250	10,000	15,000		25,000
Together.........		$83,000	$40,000	$25,000	$148,000

Because of the confusion that would otherwise enter into the comparison, it was agreed with the management that the raw material in each unit of Product C manufactured and sold during both years should be considered as costing $8. It was also agreed to redistribute overhead to the three products on a direct-labor-cost basis.

Prepare a statement showing to what extent the decline in the gross profit was attributable to changes in sales volume, prices, and production costs. Show computations of adjusted unit costs.

(Uniform Certified Public Accountant Examination, November, 1942)

Problem 9

The Town Company is a manufacturer, producing two principal products known as XO and MO. Incidental to the production of these products, it produces a by-product known as Bypo. The company has three producing departments which it identifies as departments 101, 201 and 301. Raw materials A and B are started in process in department 101. Upon completion of processing in that department one-fifth of the material is by-product and is transferred directly to stock. One-third of the remaining output of department 101 goes to department 201 where it is made into XO and the other two-thirds goes to department 301 where it becomes MO. The processing of XO in department 201 results in a gain in weight of material transferred into the department of 50 % due to the addition of water at the start of the processing. There is no gain or loss of weight in the other processes.

The company considered the income from Bypo, after allowing five cents per pound for estimated selling and delivery costs, to be a reduction of the cost of the two principal products. The company assigns department 101 costs to the two principal products in proportion to their net sales value at point of separation, computed by deducting costs to be incurred in subsequent processes from the sales value of the products.

The following information concerns the operations during April 1951:

INVENTORIES

	March 31		April 30
	Quantity (pounds)	Value	Quantity (pounds)
Department 101	None		None
Department 201	800	$17,160	1,000
Department 301	200	2,340	360
Finished stock—XO	300	7,260	800
Finished stock—MO	1,200	18,550	700
Finished stock—Bypo	None		None

Inventories in process are estimated to be one-half complete in departments 201 and 301, both at the first and last of the month.

COSTS

	Material used	Labor and burden
Department 101	$134,090	$87,442
Department 201	—	31,950
Department 301	—	61,880

The material used in department 101 weighed 18,000 pounds.

SALES PRICES

XO—	$29.50 per pound
MO—	17.50 per pound
Bypo—	.50 per pound

Prices as of April 30th are unchanged from those in effect during the month.

You are to prepare the following statements covering the operations of the Town Company. Present all supporting computations in good form.

a. Statement showing costs and production by departments for the month of April. The company uses first-in, first-out to cost out production.

b. A schedule of inventory values for work in process and finished goods as of April 30.

(Uniform Certified Public Accountant Examination, November, 1951)

CHAPTER XV

Questions

1. What are estimate costs? What relationships are there between estimate costs and process cost accounting? between estimate costs and job order cost accounting?

2. Are estimate costs used extensively in business enterprises? To what types of concerns may estimate costs be well adapted?

3. Briefly outline the general accounting principles underlying the development of estimate cost systems.

4. Of what importance are budgets in formulating estimates of material costs? labor costs? manufacturing overhead?

5. What are estimate cost cards? What information is included in these records? Of what use are estimate cost cards to management?

6. Describe the accounting procedure involved in using estimate costs in connection with a job order cost accounting system.

7. What general ledger accounts are required when an estimate cost plan, with a separate work in process account for each element of cost, is used supplementary to a system of process cost accounting?

8. Describe the accounting procedure underlying the estimate cost plan indicated in Question 7.

9. How are work in process inventories computed under the estimate cost accounting plan? What accounting treatment should be afforded the inventories?

10. Discuss the computation of variances. Of what importance are variances to management? How should debit variances be treated in the general ledger accounts and periodic statements? How should a credit variance be disposed of at the close of each accounting period?

11. Explain the estimate cost accounting procedure when a separate work in process account is used for each production department. Indicate two other methods for estimate cost accounting.

12. What are the important advantages and weaknesses of estimate costs in comparison with historical cost accounting methods?

Problem 1

The Samson Paper Box Co. manufactures shopping bags which are sold to department and food stores. The estimated cost of the bags is 4¢ each; the selling price is 5¢ each. The company uses a single work in process account. During the month of July actual production costs totaled $10,000, and 240,000 bags were completed. On July 31, 10,000 bags, estimated to be three-fourths completed, were in production processes. During the month 150,000 bags were sold for cash at 5¢ each.

a. Prepare journal entries to record transactions for July and submit ledger accounts.

b. Compute work in process and finished goods inventories as of July 31.

c. *Explain why this method of cost accounting might not be satisfactory to* management.

d. Correct the estimated cost per bag for the next period.

Problem 2

The Reliable Battery Co. produces a storage battery. During the month of June costs were as follows: direct materials, $5,000; direct labor, $4,000; and factory overhead, $3,500. Sales amounted to 1,000 batteries @ $15 each, while production totaled 1,250. There was no work in process at the beginning or end of the month.

a. Assume that the company uses only one work in process account. The estimated cost to manufacture was $10. Give all journal entries, debiting Work in Process at actual and crediting it at estimated. Record adjusting entries to show the finished goods and cost of goods sold at actual. Revise the estimated costs.

b. Assume the company used three work in process accounts with the following estimated costs:

Material	$ 3
Labor	4
Factory overhead	3
Total	$10

Solve as in *a*, except that three work in process accounts are to be used. Explain why method *b* is more satisfactory than method *a*.

Problem 3

The Midwest Fertilizer Co. employs an estimated cost plan in the production of one of its products branded as Amco. The estimated cost of the product by cost elements per hundred pounds is

Direct material cost	$1.00
Direct labor cost	1.60
Factory overhead cost	1.20
Total cost	$3.80

The selling price of Amco is $4.50 per 100-lb. bag.

During the month of December the actual costs of manufacture were as follows:

Materials requisitioned	$2,000
Direct labor cost	3,200
Factory overhead cost	2,200

Production records show completed production of 2,000 units for the month; sales records show 1,600 units sold during the period. Inventory records exhibit the following data:

Work in process inventory Dec. 1:
Direct material cost, 250 units @ $1 each.
Direct labor cost, 250 units (40% completed) @ $1.60 each.
Factory overhead, 250 units (40% completed) @ $1.20 each.
Work in process inventory Dec. 31:
200 units estimated to be 60% completed. All materials are added at the beginning of production processing.

Required:

a. Journal entries to record all transactions for December.
b. Journal entries to dispose of variances.
c. A statement of corrected estimated costs for the product Amco.

Problem 4

The Eastern Pen Co. manufactures the Elite fountain pen. The company uses an estimated cost system with three work in process accounts. The estimated costs and selling price for March are as follows:

Material cost	$ 3.00
Labor cost	1.50
Overhead cost	2.50
Total	$ 7.00
Selling price	10.00

During the month of March the following transactions occurred:

1. Material purchased		$13,500
2. Material consumed:		
Direct material	$11,500	
Indirect material	2,000	13,500
3. Payrolls:		
Direct labor	$ 5,500	
Indirect labor	500	6,000
4. Overhead:		
Depreciation	$ 500	
Taxes payable	500	
Costs vouchered and paid	7,000	8,000

Production started in process, 4,000 units.
Production finished during period, 3,800 units.
Fountain pens sold during period, 3,500 units.
Closing inventory of work in process, on Mar. 31, consisted of 200 units which had received two-thirds of the material costs and three-fifths of labor and overhead costs.

a. Present journal entries for month.
b. Close variance accounts, assuming that variances were due to incorrect estimates.
c. Revise estimated costs for the Eastern Pen Co.

Problem 5

The Barnes Electric Co. is engaged in the production of an automatic electric toaster. An estimated cost system, based on a monthly production, is used. The estimated monthly production is 40,000 units; the estimated overhead is $140,000. The firm uses three work in process accounts.

The estimated cost card is as follows:

Material	$ 0.80
Labor:	
5 hr. @ $1.50	7.50
2 hr. @ 0.90	1.80
Factory overhead:	
7 hr. @ $0.50	3.50
Total	$13.60

The transactions for April are as follows:

1.	Purchases	$ 34,600
2.	Material used	27,120
3.	Direct labor used per payrolls	320,000
4.	Production completed, 32,000 units	
5.	Closing inventory: 4,000 units, ¼ complete as to material, labor, and overhead.	
6.	Factory overhead:	
	Depreciation, building and equipment	$ 10,000
	Taxes	5,000
	Power and light	6,000
	Heat	3,000
	Supplies	15,000
	Salaries	50,000
	Indirect labor	20,000
7.	Sales, 22,000 units:	
	10,000 @ $15.00	$150,000
	12,000 @ $16.00	192,000
	Selling costs	30,000
	General administrative costs	12,000

a. Prepare journal entries for all transactions for April.
b. Submit a revised schedule of estimated costs.
c. Prepare journal entries to dispose of variances, assuming that they are the result of incorrect cost estimates.
d. Prepare a profit and loss statement for April.

Problem 6

The Standard Furnace Co. made the following estimates per furnace installation on an order of five identical furnaces for five city school buildings:

Material cost	$325
Labor cost	175
Overhead cost	100
Total	$600
Contract sales price	800

For the month of January the entire staff was employed in installing the five furnaces. Transactions during the month included:

1. Material purchased		$1,750
2. Material requisitioned:		
Direct material	$1,500	
Indirect material	50	1,550
3. Direct labor		650
4. Indirect labor		100
5. Overhead (excluding indirect labor and material)		200

Started during month, five furnace installations.
Finished during month, two installations.
Incompleted work on Jan. 31:

	Material	Labor	Overhead
Installation 3	All	⅘	⅘
Installation 4	⅘	⅗	⅗
Installation 5	⅘	⅖	⅖

The accounting records are kept on an estimated cost basis; three work in process accounts are used.

Required:

a. Journal entries for the month of January.
b. Revised schedule of estimated costs.
c. Statement of cost of manufacture.
d. Journal entries to dispose of variances, assuming that variances are the result of incorrect cost estimates.
e. Profit and loss statement for January.

Problem 7

The Portable Radio Co. manufactures two models of small radios. The estimated costs and selling prices are as follows:

	Deluxe	Standard
Materials	$11	$ 3
Labor	2	5
Overhead	4	4
Total	$17	$12
Selling price	22	15

These comparisons are to be made monthly so that differences between estimated and actual costs can be detected and controlled currently.

Product X has been manufactured by two major processes developed in the Fabricating and Finishing departments. Estimated costs per unit of product for each of these departments follow:

PRODUCT X
ESTIMATED COST PER UNIT

	Fabricating Department			Finishing Department		
	Quantity or time	Estimated value	Total	Quantity or time	Estimated value	Total
Direct materials...	3 units	$1.20	$3.60			
Direct labor.......	2 hours	.90	1.80	1.5 hours	$1.00	$1.50
Manufacturing overhead............	2 hours	.60	1.20	1.5 hours	.50	.75
Total..............................			$6.60			$2.25

Product and cost data for operations during the first month under the contract are as follows:

	Fabricating Department		Finishing Department	
Beginning inventory:				
Quantity.......................	200 units		80 units	
Average state of completion........	35%		55%	
Costs—				
Direct materials...............	$720			
Transfer materials from Fabricating Department..........			$528	
Direct labor..................	126		66	
Manufacturing overhead.......	84	$ 930	33	$ 627
Materials purchased and issued.....		$9,100		
Direct labor incurred..............		3,810		$3,860
Manufacturing overhead incurred...		3,180		2,105
Ending inventory—				
Quantity.......................	300 units		240 units	
Average state of completion........	60%		70%	

NOTE: *The amounts in the above tabulation are at actual cost, with the exception of the beginning inventories, which are stated at estimated cost.*

During the month, 2,000 units were finished, of which 1,800 units were shipped to the purchaser under the contract. Goods are assumed to be produced and sold on a first-in, first-out basis.

(Uniform Certified Public Accountant Examination, May, 1944)

Problem 10

From the following information, concerning Dart Co., prepare a statement showing the estimated cost of producing 13,500 tons of X product for the purpose of bidding on a government contract.

Dart Co. manufactures X, a main product, and Y, a by-product. X is produced and sold by the ton (2,000 pounds). The raw material used in production consists of three ingredients, "H," "I," and "J," contained in both the finished main and finished by-product in proportions and at estimated costs per ton set forth on page 553:

"H"—40% at $8 per ton
"I"—36% at $5 per ton
"J"—24% at $7 per ton

The contract for 13,500 tons of X represents 60% of the budgeted 1945 production of X by Dart Co.

Main-product X is manufactured through four processes, as follows:

Process No. 1—Ingredients "H" and "I" are issued at the outset of process No. 1; completed work in process is transferred to process No. 2.

Process No. 2—Ingredient "H," at the end of process No. 2, suffers a 5% weight loss due to evaporation and 10% of the remaining work in process is sold as waste at a nominal amount of $6 per ton; completed work in process is transferred to process No. 3.

Process No. 3—Ingredient "J," at the outset of process No. 3 is mixed with work in process. Ingredient "J" loses 4% of its original weight due to evaporation at the end of process No. 3.

Process No. 4—In this final process, the material is separated into main-product X and by-product Y in the proportions of 80% and 20% respectively, and such products are placed in salable form.

Estimated direct labor per ton by processes is as follows:

Process	Direct Labor per Ton
No. 1...........	$5.00
2...........	2.50
3...........	3.00
4...........	4.00

Manufacturing overhead expense at normal capacity, *i.e.*, 75% of a total plant capacity of 25,000 tons annually of X, is as follows:

Process	Variable	Fixed	Total
No. 1..............	$ 60,000	$30,000	$ 90,000
2..............	62,000	18,000	80,000
3..............	50,000	20,000	70,000
4..............	40,000	16,000	56,000
Total..........	$212,000	$84,000	$296,000

At the normal capacity level, general manufacturing overhead expense applicable to the factory as a whole amounts to $60,000, of which 40% is fixed.

It is expected that the units called for by the government contract, coupled with the company's curtailed civilian production during 1945 will reach 90% of total-plant capacity measured in finished units of product X.

Product Y is expected to sell for an estimated $20 per ton, before deduction for handling, selling and administrative expenses of $2.50 per ton.

Carry all computations to two decimal places.

(Uniform Certified Public Accountant Examination, May, 1945)

CHAPTER XVI

Questions

1. Are standards exclusively a product of this decade? Discuss various forms of standards that have been used before the advent of standard cost systems.

2. What defects in the older types of cost accounting have led to the development of standard costs?

3. Are standard cost accounting plans separate types of cost systems? Explain.

4. What are the differences in objectives between estimate and standard costs?

5. What different meanings are frequently given to the term "standards"? Why does such a disagreement exist?

6. Define standard costs. At what level should standards be set? Explain your answer, indicating the differences between quantity, time, and price standards.

7. What advantages are attributed to the use of standard costs? Discuss each advantage briefly.

8. How should manufacturing departments and factory personnel be organized in preparation for the operation of a system of standard costs?

9. What are standard cost cards? What information do they contain? Of what importance is a file of standard cost cards to management?

10. How are standards for material quantities prepared? Should any allowance be made for waste or spoilage of materials? Are material quantity standards subject to frequent change?

11. What procedure should be followed in preparing material price standards? Of what importance are budgets in setting these standards? How frequently should material price standards be revised?

12. Describe the process employed in computing labor time standards.

13. How are labor price standards (labor rates) determined? What budgetary elements are involved?

14. Discuss the procedure involved in setting overhead standards. Give the formula for the determination of a standard departmental overhead rate.

15. What factors determine the level at which standard overhead rates should be set? What should standard rates represent?

16. Should standard overhead rates be normal rates? Explain. Describe the process of preparing standard overhead and standard production estimates.

17. What are flexible budgets? How may standard overhead rates be computed for various volumes of productive activity? How are such rates used in costing production from month to month?

18. Discuss the problem of revising standards.

CHAPTER XVII

Questions

1. Explain the general accounting procedure for three different types of standard cost plans.

2. What advantages are attributed to Method I? Give in outline form the accounting procedure for Method I as applied to enterprises which are not departmentalized.

3. How are work in process inventories computed and valued?

4. Explain how each of the following variances is determined:

a. Material price variance.
b. Material quantity variance.
c. Labor wage variance.
d. Labor time variance.
e. Overhead—budget variance.
f. Overhead—capacity variance.
g. Overhead—efficiency variance.

5. Describe the accounting procedure for departmentalized manufacturing concerns in accordance with Method I. How does the procedure differ from the plan used for enterprises which are not departmentalized?

6. What are the advantages of departmentalization in a plant in which standard costs are used?

7. Indicate two other methods of accounting for standard costs by which work in process accounts are charged for actual cost of production and are credited for standard cost of work completed.

8. Describe briefly the standard cost accounting procedure whereby work in process accounts are charged with standard costs and credited with standard costs, variances being computed prior to entries in work in process (Method II).

9. Explain two methods of accounting for materials in accordance with Method II. What advantages may be attributed to each?

10. What procedure is followed in accounting for labor? How and when are variances computed?

11. Explain the procedure used in accounting for overhead costs.

12. Is it possible to maintain a system of standard costs in special-order industries? Explain.

13. What difficulties are encountered in setting standards in special-order industries? Explain. What methods are employed in determining material standards? Labor standards? Overhead standards?

14. Explain how standard costs can be used in special-order industries. Do you favor the inclusion of standard costs in subsidiary records exclusively? Discuss.

Problem 1

The following data are a summary of the actual and standard costs of production for Shumard Co. for May:

Costs	Standard costs		Actual costs	
Direct materials..	5,000 units @ $0.20	$ 1,000	5,500 units @ $0.22	$ 1,210
Direct labor......	8,000 hr. @ 1.40	11,200	7,600 hr. @ 1.42	10,792
Factory overhead.	8,000 hr. @ 0.90	7,200	7,600 hr.	8,512

The standard factory overhead rate is calculated as follows:

$$\frac{\text{Standard factory overhead}}{\text{Standard labor-hours of operation}} = \frac{\$9{,}000}{10{,}000} = \$0.90 \text{ per hr.}$$

Compute the following variances and indicate whether the variance is a debit or credit in each case:

a. Material price variance.
b. Material quantity variance.
c. Labor wage variance.
d. Labor time variance.
e. Overhead—budget variance.
f. Overhead—capacity variance.
g. Overhead—efficiency variance.

Problem 2

The Jefferson Co. had the following actual costs and production data for the plastics department for June:

Materials, 2,000 units @ $0.80..........	$1,600.00
Labor, 600 hr. @ $1.80................	1,080.00
Factory overhead, 600 hr..............	888.00

The standard costs for the department are as follows:

Materials, 2,200 units @ $0.76..........	$1,672.00
Labor, 620 hr. @ $1.84................	1,140.80
Factory overhead, 620 hr. @ $1.46......	905.20

The budget for the plastics department for June contains standard overhead costs of $949 and standard direct labor-hours of operation of 650.

Compute seven variances between actual and standard costs for the month, showing your computations in schedules and indicating whether the balance is a debit or credit in each case.

Problem 3

The Campbell Co. operates a standard cost accounting system in which the work in process accounts are charged with actual costs and credited with standard costs.

The standard cost card contains the following:

Materials:	
1 piece @ $1.50....................................	$ 1.50
Labor:	
3 hr. @ $1.00......................................	3.00
Factory overhead:	
3 hr. @ $2.50......................................	7.50
Total standard cost per unit of finished product......	$12.00

Factory overhead budget for July, $7,500; direct labor budget for July, 3,000 direct labor-hours.

The following information is given for July:

1. Actual materials used in production per requisitions: 1,100 units @ $1.60.
2. The payroll shows all direct labor is to be charged to production as follows: 2,700 hr. @ $1.20.
3. The Factory Overhead Control account shows a balance of $7,425 to be charged to production.
4. Production records reveal that 950 units have been completed and 100 units remain in process one-half completed.
5. Value of units remaining in process is transferred to a work in process inventory account.

Required:

Journal entries to record the above transactions and to set up the proper variance accounts.

Problem 4

The Shawnee Co. operates a standard cost accounting system. The work in process accounts are charged with actual costs and credited with standard costs.

STANDARD COST CARD

Materials:	
5 pieces @ $1.50....................................	$ 7.50
Labor:	
10 hr. @ $1.75......................................	17.50
Factory overhead:	
10 direct labor-hours @ $0.80......................	8.00
Total standard cost per unit of finished product......	$33.00

The standard factory overhead rate is determined as follows:

$$\frac{\text{Standard factory overhead for August}}{\text{Standard labor-hours for August}} = \frac{\$8{,}800}{11{,}000} = \$0.80 \text{ per hr.}$$

The following information is available for the month of August:

1. Actual materials used in production, per requisitions: 5,500 pieces @ $1.45.
2. The payroll shows that direct labor was charged to production as follows: 10,500 hr. @ $1.77.
3. The Factory Overhead Control account shows a balance of $8,500 to be charged to production.
4. Production records reveal that 850 units have been completed and 220 units remain in process ½ completed.
5. The value of the units in process is transferred to a work in process inventory account.

Required:

Journal entries to record the transactions for the month of August and to set up the proper variance accounts.

Problem 5

The standard cost of Product A, manufactured by the Dickey Manufacturing Co., is based on a monthly production of 400 units in 17,600 hr. of operation. Standard factory overhead costs for the month (per budget) are $28,160.

STANDARD COST CARD

Materials:	
50 pieces of X @ $1.90	$ 95.00
Labor:	
44 hr. @ $1.00	44.00
Factory overhead:	
44 hr. @ $1.60	70.40
Total	$209.40

The company debits the work in process accounts for actual costs and credits them for standard costs.

Transactions for the month of January are as follows:

1. Purchases per invoice:	
7,000 pieces of X @ $2.05	$14,350
Supplies	200
	$14,550
2. Materials used per requisition, at actual:	
16,500 pieces of X @ $1.80	$29,700
3. All supplies purchased were used during the month.	
4. Direct labor per payroll:	
8,400 hr. @ $0.90	$ 7,560
5. Factory overhead incurred in addition to the above items:	
Vouchers paid	$ 9,800
Depreciation	3,200
Insurance	1,000
Taxes	600
6. Production, 200 units of Product A.	

7. Closing inventory of work in process: Product A, 124 units, all material, one-fourth labor, and one-fourth overhead used.

8. Sales, 266 units @ $310	$82,460
9. Selling costs	2,000
10. Administrative costs	3,200

Required:

Journal entries to record the above transactions and to set up the proper variance accounts.

Problem 6

The Nico Manufacturing Co. manufactures an automobile accessory and sells the entire output to jobbers. The company has a standard cost system. The standard unit cost of the product by cost elements is as follows:

Direct materials	$ 4.80
Direct labor, 2 hr. @ $1.60	3.20
Factory overhead, 2 hr. @ $1.50	3.00
Total standard cost per unit	$11.00

The selling price per unit is $12.50. The production budget for the year contains an estimate of 25,000 units to be completed in 50,000 hr. of labor operations costing $80,000. The factory overhead budget contains an estimated total overhead for the year of $75,000.

During January the actual costs and conditions of operation were as follows:

1. Number of units completed, 2,000.
2. Inventory of work in process on Jan. 31, 50 units upon which all material and one-half of labor and overhead have been applied.
3. Materials requisitioned from stock, $10,000; material prices have not changed since standard material prices were computed.
4. Direct labor costs, 4,000 hr. @ $1.62 an hour.
5. Factory overhead, $6,000.
6. During January 1,500 units were sold on account for $12.50 per unit.

The company uses three work in process accounts, one account for each element of cost; the work in process accounts are debited for actual costs and credited for standard costs.

Required:

Journal entries for all transactions for the month, including the setting up of variances.

Problem 7

The Office Furniture Co. manufactures the Sturdy bookcase for law offices. Only two different metal pieces, designated as *a* and *b* are treated as direct materials. Other items such as metal screws are considered to be overhead costs. The standard cost card for the Sturdy bookcase exhibits the following data:

Materials:		
5 pieces of *a* @ $1.50	$7.50	
7 pieces of *b* @ 1.00	7.00	$14.50
Labor:		
2 hr. @ $3.00		6.00
Overhead:		
2 direct labor-hr. @ $0.80		1.60
Total standard cost		$22.10

The standard factory overhead rate is calculated as follows:

$$\frac{\text{Standard overhead}}{\text{Standard labor-hours of operation}} = \frac{\$1,920}{2,400} = \$0.80 \text{ per hr.}$$

Transactions for July:

1. Purchases, per invoices:

   6,000 pieces of *a* @ $1.45.
   7,500 pieces of *b* @ $1.03.

2. Materials used, per requisitions, at actual:

   5,500 pieces of *a* @ $1.45.
   6,500 pieces of *b* @ $1.03.

3. Direct labor, per payroll, 2,100 hr. @ $3.05.
4. Factory overhead incurred, $2,200.
5. Sales, 900 units @ $30.
6. Production:
   950 units completed.
   100 units in process; only material *a* has been used; one-half completed as to labor and factory overhead.

a. Prepare journal entries to charge work in process accounts with actual costs and credit with standard costs.

b. Analyze and record variances from standard costs in journal entry form; submit a schedule in support of each journal entry, showing computation of the variances.

Problem 8

During the month of May, the ABC Tie Rack Co., a small enterprise producing a single but unique tie rack, had a total production of 2,480 completed tie racks. As production involved mostly hand operations, all units which were begun during the month were completed.

The standard overhead costs for May as set forth in the overhead budget are $500 which are to be apportioned to the standard production for the month of 1,250 direct labor-hours shown in the production budget. The company follows the policy of charging work in process accounts for actual costs and crediting them for standard costs. Variances between actual and standard costs are recorded in separate variance accounts.

The standard cost card for the production of a tie rack includes the following information:

Materials:	
1 sq. ft. of plastic @ $0.25	$0.25
Labor:	
½ hr. @ $0.80	0.40
Overhead:	
½ hr. @ $0.40	0.20
Total standard costs	$0.85
Selling price per unit	1.10

Transactions for the month of May were as follows:

1. Materials purchased on account:	
4,250 sq. ft. of plastic @ $0.24½	$1,041.25
Supplies	45.00
2. Materials and supplies consumed per requisitions:	
2,490 sq. ft. of plastic @ $0.24½	$ 610.05
Supplies	40.00
3. Labor costs vouchered and paid (ignore withholdings):	
Direct payroll, 1,245 hr. @ $0.83	$1,033.35
Indirect payroll, 125 hr. @ $1.00	125.00
4. Overhead costs vouchered and paid:	
Rent	$ 115.00
Power and light	55.00
Repairs	20.00
5. Overhead costs per adjustments:	
Depreciation of equipment	$ 40.00
Insurance	20.00
Shipping costs	55.00
Payroll taxes	45.00
6. Sales on account for month:	
2,250 units @ $1.10	$2,475.00

Required:

Journal entries to record all transactions showing the computation of all variances in supporting schedules.

Problem 9

The Chicago Novelty Co. manufactures two products which are coded as A and B. The company uses a standard cost accounting system with a work in process account, a finished goods account, and a variance account for each product. The work in process accounts are charged for production at actual cost and credited for completed production at standard cost.

The standard cost cards of the two products contain the following information:

Product A		Product B	
Material, 5 units @ 10¢	$0.50	Material, 10 units @ 8¢	$ 0.80
Labor, 2 hr. @ $1.60	3.20	Labor, 4 hr. @ $1.75	7.00
Overhead, 2 hr. @ 80¢	1.60	Overhead, 4 hr. @ 50¢	2.00
Total standard cost	$5.30	Total standard cost	$ 9.80
Selling price	$6.00	Selling price	$11.00

On Jan. 1, there were no beginning inventories of work in process. Finished goods inventories, figured at standard costs, consisted of 2,500 units of Product A and 750 units of Product B. The overhead cost and production budgets for the fiscal year contain the following estimates:

	Product A	Product B
Overhead cost	$32,000	$50,000
Hours of direct labor	40,000	100,000
Units of production	20,000	25,000

Production for January is summarized as follows: Product A, 2,000 units; and Product B, 2,200 units. Sales on account consisted of 3,000 units of Product A and 1,500 units of Product B.

Direct materials consumed during January are summarized as follows:
Product A, 10,500 units @ 11¢ per unit.
Product B, 23,000 units @ 7¢ per unit.

Direct labor for January is summarized as follows:
Product A, 4,200 hr. @ $1.62 per hr.
Product B, 8,900 hr. @ $1.70 per hr.

Actual overhead costs for January are as follows: Product A, $3,000; and Product B, $4,500.

a. Prepare journal entries to record all transactions for January.

b. Prepare a schedule exhibiting in detail variances from standard costs for each product.

Problem 10

The Pearson Supply Co. manufactures a standard all-metal storage cabinet. Production has been departmentalized into three production departments: A, B, C. The standard cost card for the product shows the following:

Materials:		
X in Dept. A, 2 pieces @ $1.00	$2.00	
Y in Dept. B, 1 piece @ 0.50	0.50	
Z in Dept. C, 2 pieces @ 0.75	1.50	
		$ 4.00
Labor:		
Dept. A, 1 hr. @ $1.85	$1.85	
Dept. B, 3 hr. @ 1.90	5.70	
Dept. C, 2 hr. @ 2.00	4.00	
		11.55
Overhead:		
Dept. A, 1 hr. @ $0.60	$0.60	
Dept. B, 3 hr. @ 0.80	2.40	
Dept. C, 2 hr. @ 1.00	2.00	
		5.00
		$20.55

BUDGET DATA FOR JULY

	Dept. A	Dept. B	Dept. C
Standard overhead costs	$270	$1,080	$900
Standard direct labor-hours	450	1,350	900

Transactions for July include:

1. Materials purchased:

Type	Units	Price
X	1,200	$1.05
Y	650	0.45
Z	1,500	0.75

2. Materials requisitioned:

Type	Units	Price
X	950	$1.05
Y	480	0.45
Z	900	0.75

3. Labor:

Dept.	Hours	Rate
A	500	$1.87
B	1,400	1.92
C	900	2.00

4. Overhead costs, totaling $2,500, are to be distributed to departments on the basis of actual direct labor-hours. They are as follows: salaries, $1,200; supplies, $350; utilities, $200; repairs, $200; all have been vouchered and paid. Monthly adjustments: accrued taxes payable, $200; depreciation of machinery, $200; insurance expired, $150.

5. Production completed: 450 units. Work in process: 25 units, completed in Dept. A; ⅖ completed in Dept. B (materials X and Y have been used). No work remains in process in Dept. C.

The company uses a single Work in Process account for each department and each departmental account is debited for actual costs and credited for standard costs. Work in process inventory is computed at standard costs for each department at the close of the monthly accounting period; the departmental accounts are credited and a single Work in Process Inventory account is debited for the total. The general ledger contains one account for each type of variance, but each variance is supported by a subsidiary analysis sheet which exhibits the computations of the variance in detail by departments.

a. Prepare journal entries to record all transactions for July.

b. Prepare journal entries to recognize all variances and support each variance with an exhibit showing its computation by departments.

Problem 11

Refer to Prob. 7, page 558. Use the information given for the Office Furniture Co. as a basis for the preparation of journal entries to record all transactions and recognize variances, assuming that it is the policy of the company to debit and credit product work in process accounts at standard costs and to value materials at actual quantity and actual cost in the stock records.

Problem 12

Refer to Prob. 8, page 559. Use the information given for the ABC Tie Rack Co. as a basis for the preparation of journal entries to record all transactions and recognize all variances; assume that it is the company's policy to debit and credit work in process accounts at standard costs and to value materials in the stock records at actual cost.

Problem 13

The Acorn Manufacturing Co. produces a single product in Dept. 3.

STANDARD COST CARD

Materials:	
8 pieces @ $10	$ 80
Labor:	
40 hr. @ $2.60	104
Factory overhead:	
40 hr. @ $0.75	30
Total standard cost per unit	$214

Standard budget data for November includes:
Factory overhead, $600.
Direct labor-hours, 800.
The following information is available for November:

1. Purchases of direct materials:
   148 pieces @ $11 .... $1,628.00
2. Direct materials requisitioned, 148 pieces.
3. Actual direct labor:
   710 hr. @ $2.65 .... 1,881.50
4. Factory overhead costs 650.00
5. Production completed, 15 units.
6. Inventory Nov. 30, 6 units one-half completed as to materials, labor, and overhead.

Required:

Journal entries to record all transactions for November. Work in process accounts are to be debited and credited at standard. The Materials Control account is to be shown at actual quantity and standard price.

Problem 14

The standard cost of part No. 412 manufactured in Dept. 6 of the DeLong Manufacturing Co. is based on a monthly production of 10,000 hr. of operation. Standard factory overhead costs for the month (per budget) are $10,000.

STANDARD COST CARD
Part No. 412

Materials:		
15 pieces of *a* @ $2.00	$30	
5 pieces of *b* @ 1.00	5	$ 35
Labor:		
20 hr. @ $2.50		50
Factory overhead:		
20 hr. @ $1.00		20
Total standard cost		$105

The company follows the policy of debiting and crediting work in process accounts at standard costs. Raw materials inventories are carried at actual quantity and standard prices.

Transactions for January are as follows:

1. Purchases per invoices:	
20,000 pieces of *a* @ $1.90	$38,000
7,000 pieces of *b* @ 0.95	6,650
2. Material used per requisitions at standard:	
7,000 pieces of *a* @ $2.00	14,000
2,000 pieces of *b* @ 1.00	2,000
3. Supplies requisitioned (overhead)	400
4. Labor per payroll:	
Direct, 9,000 hr. @ $2.60	23,400
Indirect, 700 hr. @ 2.00	1,400
5. Factory overhead incurred in addition to the above items:	
Vouchers paid	6,000
Depreciation	1,200
Insurance	400
Property taxes	700

6. Production completed for month, 450 units.

7. Closing inventory of work in process, eight units ½ completed as to labor and overhead; three-fourths of material *a* has been added to these units and one-fourth of material *b* has been added.

Required:

Journal entries to record the above transactions and to set up the proper variance accounts.

Problem 15

The Riley Co. produces nonslip rubber bath mats. The standard cost card shows the following data:

Material, ⅒ sheet of rubber @ $0.80	$0.08
Labor, ⅓ hr. @ $1.20	0.40
Overhead, ⅓ hr. @ $1.80	0.60
Total standard costs	$1.08

The standard budgets for January show standard overhead costs, $5,400; standard direct labor-hours, 3,000.

Transactions for January:

1. Purchased 1,000 sheets of rubber @ $0.82.
2. Requisitioned 975 sheets of rubber.
3. Direct labor payroll, 3,140 hr. @ $1.25.
4. Overhead costs, $5,700.
5. Production: 9,000 units completed. 600 units completed as to material; one-half completed as to labor and overhead costs.
6. Sales, 8,900 units @ standard selling price of $1.59.

Required:

Journal entries for the month debiting and crediting work in process accounts at standard. Materials are valued at standard costs in the stock records.

Problem 16

The Ace Tennis Racket Corp. manufactures a single type of tennis racket sold under the trade name of Ace. The company buys the frames from a nationally known sporting-goods company but strings and finishes the rackets, which are sold to an exclusive list of tennis coaches and small sport shops.

The company employs a standard cost system which provides for a single Work in

Process account being charged at standard costs and credited at standard costs. A variance account is used for each of the seven variances. Inventory and stock records are carried at standard prices.

The standard cost card for the Ace racket contains the following data:

Materials:		
1 frame @ $5.00	$5.00	
1 roll of gut @ $3.50	3.50	
1 roll of binding @ $0.40	0.40	$ 8.90
Labor:		
1½ hr. @ $1.00		1.50
Overhead:		
1½ hr. @ $0.80		1.20
Total standard cost		$11.60
Selling price		14.00

The budgets of overhead and production for the year include the following:
Standard overhead costs, $28,800.
Standard direct labor-hours, 36,000.
Standard production, 24,000 rackets.

Inventories on March 1 were as follows:

Materials:		
Frames, 500 @ $5.00	$2,500	
Gut, 200 rolls @ $3.50	700	
Binding, 800 rolls @ $0.40	320	
Supplies	1,200	$ 4,720
Finished rackets, 3,000 @ $11.60		34,800
Total inventories		$39,520

Transactions for March are summarized as follows:

1. Materials purchased (vouchered and paid):

Type	Units	Price	Cost
Frames	1,500	$5.05	$ 7,575
Frames	1,000	5.10	5,100
Gut	3,000	3.45	10,350
Binding	2,000	0.42	840
Supplies			600
			$24,465

2. Materials requisitioned:

Type	Units
Frames	2,520
Gut	2,530
Binding	2,400
Supplies	$500

3. Payrolls vouchered and paid:

Direct labor, 3,800 hr. @ $1.05	$3,990
Supervisory and clerical salaries	600
	$4,590

Withholdings:		
F.I.C.A. tax	$ 90.00	
Federal income tax	1,210.00	1,300
Amount of payroll vouchers		$3,290

4. Overhead costs vouchered and paid:

Rent	$ 200
Power and light	100
Repairs	50
	$ 350

5. Overhead costs per monthly adjusting entries:

Payroll taxes	$ 200
Depreciation of equipment	150
Insurance	50
Property taxes	100
Telephone and telegraph	50
Shipping costs	450
	$1,000

6. Selling costs vouchered and paid, $500.
7. Production for March, 2,500 rackets.
8. Sales on account, 1,500 rackets; sales for cash, 1,200 rackets.

a. Prepare journal entries to record all transactions for March and to recognize variances from standards.

b. Prepare exhibits showing the computation of variances.

CHAPTER XVIII

Questions

1. The value of a standard cost accounting program is dependent upon the amount of responsibility that management assumes in recognizing, investigating, and correcting conditions which cause variances from standards. What is meant by "responsibility," and how can it be delegated and measured?

2. What methods may be used to report variances from standards by responsibilities? Do you think that workers and shift supervisors should be informed of material and labor variances from standards, or should such data be made available exclusively to management?

3. How often do you think that variances from standards should be reported? for each shift? for each day's work? weekly? monthly? Would your reporting period be different for various types of variances? Explain.

4. If you were requested to establish a policy as to the proper disposition of variances from standard costs, what general rules would you recommend for use by your cost department?

5. What departmental executives should be held responsible for material price variances? How often and to whom should such variances be reported?

6. List five forms of inefficiency in procuring materials that may be discovered as the result of investigating material price variances, and explain what measures may be taken in each case to prevent their recurrence.

7. What disposition of material price variance would you recommend when it is attributed to each of the following causes: inefficiency in purchasing, changes in market prices, failure to take advantage of cash discounts, and seasonal conditions?

8. What supervisory personnel should be held responsible for material quantity variances? What methods may be used to accumulate, summarize, and report variances in material quantities from standards? To whom and how frequently should such reports be submitted?

9. List five forms of inefficiency in the use of materials that may be discovered as the result of investigating material quantity variances. What measures may be taken in each situation to prevent their recurrence?

10. What disposition of material quantity variance would you recommend when it is attributed to each of the causes which you listed for Question 9?

11. What supervisory personnel should be held responsible for labor time variances? Do you think that the workers should be permitted to compare their time with the standards provided for their job classification; or do you think that better control can be exercised when off-standard conditions are reported exclusively to supervisors?

12. What type of reports of labor time variances will permit the maximum investigation and control of off-standard conditions by management?

13. List five forms of inefficiency in the utilization of labor that may be isolated as the result of an investigation of labor time variances. What measures may be taken in each situation to prevent their recurrence?

14. What policy would you recommend for the proper disposition of labor time variances when consideration is given to each of the causes which you listed for Question 13?

15. What department should be given the responsibility for the tabulation and reporting of labor wage variances? How frequently should reports be prepared and to whom should they be submitted?

16. What conditions may cause labor wage variances? What disposition in the accounting records should be made for the variance in each case?

17. What officials are responsible for overhead—budget variances? How frequently and to whom should reports of these variances be made?

18. What forms of inefficiency may be uncovered when a comparison is made of actual overhead costs and standard budget requirements? What disposition would you recommend for overhead—budget variances resulting from the following causes: increase in plant operations requiring additional supervisory personnel; department head incurred cost of supplies in excess of standard budget allowances; and a portion of the total variances has resulted from seasonal conditions of overhead?

19. What officials should be responsible for the analysis and investigation of overhead—capacity variance? How frequently can reports of this variance be prepared?

20. List five circumstances that may result in causing an overhead—capacity variance. What disposition of the variance would you recommend for each of the circumstances that you have listed?

21. What supervisory personnel should be held responsible for overhead—efficiency variances? Describe the reporting, analysis, and investigation of these variances. What policy would you suggest for the proper disposition of such variances?

22. What types of monthly or quarterly standard cost statements should be prepared? How can each statement be used by management for purposes of control?

Problem 1

Indicate the disposition of the following variances. Some may require two answers.

a. Apportion the balance among the Cost of Goods Sold, Finished Goods, and Work in Process accounts.

b. Treat as a deferred charge.

c Treat as a deferred credit.

d. Charge to Profit and Loss.

e. Credit to Profit and Loss.

f. Charge to Earned Surplus.

g. Credit to Earned Surplus.

1. If the Material Price Variance account balance is due to inefficiency on the part of the purchasing agent.

2. If the credit balance of the Overhead—Capacity Variance account is due to seasonal conditions.

3. If the Overhead—Budget Variance account has a credit balance which is due to both seasonal conditions and incorrect standard rates.

4. If the Labor Time Variance account has a credit balance due to efficient production.

5. If the Overhead—Efficiency Variance account has a debit balance due to inefficiency.

6. If the Material Quantity Variance account has a debit balance due to inefficiency.

7. If the Overhead—Budget Variance account has a credit balance due to seasonal conditions, the current accounting period being the final one in the budget period.

8. If the Labor Wage Variance account has a debit balance because the employees called a strike and received a 10¢ hourly increase in wages.

9. If the Overhead—Budget Variance account has a debit balance due to repair of tornado damage.

10. If the Material Price Variance account has a credit balance due to price fluctuations.

Problem 2

Prepare journal entries to dispose of variance accounts due to the following causes:

1. Substantial change in the market price of raw material A, variance Dr., $900.

2. Careful workmanship resulted in a savings of raw materials, variance Cr., $1,200.

3. Workers on the production line slowed down due to unseasonably hot weather, variance Dr., $400.

4. Bonus scheme in union contract changed, variance Dr., $1,500.

5. The machinery repair cost during the month was substantial, but the repairs were contemplated and were included in the yearly budget for overhead, variance Dr., $3,000.

6. The plant was shut down for 3 days due to lack of water supply during unseasonably hot weather, variance Dr., $400.

7. Unit production decline due to inefficiency of workers, variance Dr., $600.

8. Excessive amounts of raw material used because of substandard quality purchased by the purchasing department, variance Dr., $1,000.

9. Production schedules have been increased because of the addition of a "swing shift" of workers, variance Cr., $4,000.

Problem 3

The Alexander Chemical Plant produces industrial chemicals and fertilizers. Effective Jan. 1 of this year a system of standard costs was introduced as a control measure and to provide incentives for more efficient production.

The controller has been informed of a special meeting of the board of directors to be held on Feb. 10 to discuss with the officers of the company the results of January operations and the success of the recently inaugurated standard cost accounting system.

The controller and the cost accountant held a conference for the purpose of reviewing the summary reports of variances from standards and preparing the profit and loss statement for January. The information considered for January operations included the following summary:

Sales	$100,000
Standard cost of completed production	85,000
Variances from standard costs due to inefficiency	20,000

The controller asked the cost accountant what he intended to do with the variances from standards. He replied that he expected to transfer the variances, totaling $20,000, to the Profit and Loss summary account and to show the variances as separate deductions from Gross Profit on Sales based on standard costs in the profit and loss statement for January. He justified this treatment of variances because the variances resulted from inefficiencies in purchasing and utilization of materials, excess labor time, excessive overhead requirements, and unnecessary slowdown of machine operations, all of which occurred during January as responsibilities of personnel carried on the January payroll.

The controller expressed dissatisfaction concerning the "loss from operations" of $5,000 for January, which would result from the $20,000 variance charge to Profit and Loss, and explained that he would be embarrassed to submit such an unsatisfactory report to the board of directors.

The cost accountant quickly responded with an alternative treatment of the January variances. He explained that since approximately 75% of the January sales was taken from December inventories, he could treat $15,000 of the $20,000 variance as a "deferred charge" to be charged against the sales of the units produced in January when they are considered as income in subsequent months. This plan would reduce the variances absorbed in January to $5,000 and would provide a profit from operations of $10,000. The cost accountant concluded that this treatment of variances is more in line with good accounting theory than his first proposal, because it results in better matching of costs and revenues.

The controller and cost accountant prepared their statements and reports for January and submitted them to the board of directors, using the second plan of disposing of variances.

Present your comments and any recommendations you wish to make regarding the above situation.

Problem 4

Refer to Prob. 9, page 560. Use the information given for the Chicago Novelty Co. to prepare a profit and loss statement, based on both actual and standard costs. Assume that all variances are due to efficiency or inefficiency.

Problem 5

Refer to Prob. 16, page 564. Use the information given for the Ace Tennis Racket Corp. to prepare a profit and loss statement, based on both actual and standard costs. Assume that all variances are due to efficiency or inefficiency, with the exception of the overhead—budget variance and the overhead—capacity variance which are due to seasonal conditions.

Problem 6

Refer to Prob. 7, page 558. Use the information given for the Office Furniture Co. to prepare a profit and loss statement, based on both actual and standard costs. Assume that the variances are due to the following causes: material price, market fluctuation; material quantity, inefficiency; labor wage, inefficiency; labor time, inefficiency; overhead—budget variance, inefficiency; overhead—capacity, inefficiency; overhead—efficiency, inefficiency.

Problem 7

Refer to Prob. 6, page 558. Use the information given for the Nico Manufacturing Co. to prepare a profit and loss statement, based on both actual and standard costs. Assume that all standards are tentative and are to be revised; therefore the variances from standard should be apportioned to Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold. There was no beginning work in process; the beginning finished goods inventory was 500 units.

Problem 8

The Hull Manufacturing Co. produces an antique hammered copper basket for fireplaces. The standard cost of the product is as follows:

Material:	
1 piece of copper @ $4.55	$4.55
Labor:	
3 hr. @ $0.75	2.25
Overhead:	
3 hr. @ $1.00	3.00
	$9.80

$$\frac{\text{Standard overhead}}{\text{Standard labor-hours}} = \frac{\$3,000}{3,000} = \$1 \text{ per hr.}$$

Production for month of July:

950 units completed.

100 units one-half completed as to labor and overhead; all material has been added.

Transactions for July:

1. Purchased material, 1,250 pieces @ $4.60.
2. Material requisitioned, 1,100 pieces.
3. Payroll, 2,950 hr. @ 80¢.
4. Overhead, $3,100.
5. Sales, 900 units @ $15.

a. Show journal entries for month debiting and crediting work in process at standard. Materials are valued at standard costs in the stock records.

b. Dispose of the variances, assuming the following: material price and labor wage variances are due to conditions beyond the control of the management; all other variances are due to inefficiency or superior operations.

c. Present a monthly condensed profit and loss statement, assuming selling and administrative costs of $1,500.

d. Prepare a cost of manufacturing statement and a cost of goods sold statement.

e. Prepare a balance sheet, assuming the following account balances on July 1: Cash, $5,000; Accounts Receivable, $1,000; Vouchers Payable, $2,000; Capital Stock, $4,000.

Problem 9

The Neosho Co. manufactures two standard products, the Magic can opener and the Quick can opener, coded 1 and 2, respectively. The company uses a standard cost system with a Work in Process account, Finished Goods account, and Variance account for each product. The Work in Process accounts are debited and credited at standard costs. The Materials Control account is debited and credited at actual costs.

The standard cost cards for the two products contain the following information:

Product 1		Product 2	
Materials:		Materials:	
Metal, 6 units @ 5¢	$0.30	Metal, 1 unit @ 5¢	$0.05
Labor: 2 hr. @ $1.60	3.20	Wood handle, 1 unit @ 2¢	0.02
Overhead, 2 hr. @ 40¢	0.80	Labor: ¼ hr. @ $2.00	0.50
Total standard costs	$4.30	Overhead, ¼ hr. @ 10¢	0.02½
		Total standard costs	$0.59½
Selling price	$5.50	Selling price	$1.00

The overhead and production budgets for the year contain the following information:

	Product 1	Product 2
Overhead costs	$ 48,000	$ 3,000
Hours of direct labor	120,000	30,000
Units of production	60,000	120,000

NEOSHO COMPANY
TRIAL BALANCE, JUNE 30, 19__

	Dr.	Cr.
Cash	$ 10,345.00	
Accounts receivable	6,000.00	
Inventories:		
Supplies	1,000.00	
Finished goods—product 1, 1,500 units	6,450.00	
Finished goods—product 2, 4,100 units	3,259.50	
Raw materials:		
Metal, 70,000 units @ 6¢	4,200.00	
Wood, 12,000 units @ 1½¢	180.00	
Prepaid insurance	200.00	
Machinery and equipment	100,000.00	
Accumulated depreciation	....	$ 2,000.00
Vouchers payable	....	1,500.00
Capital stock	....	120,000.00
Earned surplus	....	17,134.50
	$140,634.50	$140,634.50

Inventories are accounted for by the first-in, first-out method. The following transactions occurred during July:

1. Purchases of wood handles:

6,000 units at 2¢	$ 120

2. Overhead costs per adjusting entries as of July 31:

Travel	$ 150
Depreciation	400
Heat, power, and light	350
Insurance	200
Payroll taxes	435
Property taxes	265
Total	$1,800

The overhead costs, including supplies, supervisory and clerical salaries, are allocated 75% to product 1 and 25% to product 2.

3. Labor costs:

Direct—Product 1, 8,200 hr. @ $1.63	$13,366
Direct—Product 2, 3,900 hr. @ $1.98	7,722
Supervisory and clerical salaries	1,800
	$22,888

4. Materials used:
   Product 1, metal, 25,000 units.
   Product 2, metal, 15,990 units.
   Product 2, wood handles, 16,200 units.
   Supplies, $400.
5. Completed production:
   Product 1, 4,000 units.
   Product 2, 16,000 units.
6. Sales on account: Product 1, 5,000 units; Product 2, 10,000 units.
7. Selling costs, $2,000; allocated 75% to Product 1; 25% to Product 2.
8. Administrative costs, $2,000; allocated 75% to Product 1; 25% to Product 2.

a. Prepare journal entries to record transactions for July and to recognize all variances from standard.

b. Prepare schedules exhibiting in detail variances from standard costs for each product.

c. Prepare journal entries to dispose of the variances; assume that the material price variance is the result of incorrect standards, that the overhead—budget variance is due to seasonal conditions, and that the other variances are due to inefficiency.

d. Prepare a profit and loss statement, based on both standard and actual costs, showing comparative data for the two products. (One statement may be prepared or a condensed profit and loss statement, supported by exhibits of manufacturing costs and cost of goods sold, may be presented.)

Problem 10

From the information following, prepare an income statement showing therein appropriate manufacturing cost variances of Bunsom Co., for January, 1946, supported by journal entries of transactions for the month.

The Bunsom Co. makes unit M. The manufacturing of unit M is based on three successive and continuous operations, namely, operations M-10 to M-12, inclusive, in which the manufacturing cost of such unit is developed as shown by the following tabulation of percentages of cost of manufacture:

Percentages of Cost of Manufacture of Unit M

Operation	Material	Labor	Overhead
M-10	20%	20%	40%
M-11	—	35	40
M-12	80	45	20
Total	100%	100%	100%

(The company does not record the actual labor charges applicable to each operation.)

The Bunsom Co., operates a cost accounting system based on standard costs which are incorporated in the manufacturing cost accounts. The differences between standard costs and actual costs are reflected in appropriate variance accounts, namely, material price, material usage, direct labor rate, direct labor time, and over-all manufacturing overhead. The material price variance is assumed to be realized at the time of purchase, irrespective of time of usage.

The standard manufacturing costs used for unit M (based on a planned monthly production ranging between 8,000 and 12,000 units M) are as follows:

	Per unit M	
	Quantity or hours	Amount
Material:		
Item M-a (issued in operation M-10)	1	$ .50
Item M-b (issued in operation M-12)	1	2.00
Direct labor (total for all operations at uniform rate of $5 per hour)	¼ hr.	1.25
Overhead (applicable to operations as a whole):		
Variable expenses		.60
Fixed expenses		.90
		$5.25

The inventories applicable to unit M as at December 31, 1945, stated in accordance with the foregoing schedule of standard costs, are as follows:

Material—Item M-a—100 units; item M-b—100 units
Work in progress—50 units complete through operation M-10
Finished goods—none

Transactions during January, 1946, are submitted as follows:

The voucher register reflects applicable transactions paid and incurred as follows:

	Amount
Material purchases—	
Item M-a—12,000 units @ $.45 per unit	$ 5,400
Item M-b—12,000 units @ 2.10 per unit	25,200
Payroll for all operations—	
Direct labor—3,100 hours @ $1.2625 per ¼ hr	$15,655
Indirect labor	1,500
Manufacturing overhead, other than indirect labor	15,000
Selling, administrative, and general expenses	25,000

Other facts are:

During January, 1946, 11,000 units M were transferred to the finished goods warehouse and 10,500 units were sold at $9 per unit M.

As at January 31, 1946, 100 units of work in progress are complete through operation M-11.

Stores requisitions indicate issuances of material items M-a and M-b in the quantities required for the production carried through the respective operations. A supplementary stores requisition, however, indicates that item M-a actually used was 2% in excess of standards quantity required.

(Uniform Certified Public Accountant Examination, May, 1946)

CHAPTER XIX

Questions

1. Distinguish between manufacturing and distribution costs. Give two costs that are strictly manufacturing, two that are strictly distribution, and two borderline costs.

2. Why is there an increasing need for control of distribution costs? Mention four products for which marketing costs require a larger proportion of the total cost to make and sell than manufacturing costs.

3. What is the Robinson-Patman Act? Why is it important to the distributor of merchandise?

4. Assume that action was brought in the Federal District Court by the U.S. government against the Sutley Wholesale Co. of Chicago, Ill. The government based its case on the fact that the Sutley Co. sold cleaning fluid to the Roe Co. of St. Louis, Mo., for $0.15 per can and during the same period sold the cleaning fluid of the same grade to the Doe Co. of Kansas City, Mo., for $0.17 per can. Discuss briefly, indicating the Federal statute under which the action was brought, why the government thought it had cause of action, and what defense the wholesale concern might have.

5. Outline a general plan of accounting for distribution costs for an enterprise selling its products through the media of its own salesmen and territories. How would the plan be changed in case it was considered desirable to account also for sales service departments?

6. What basis would you recommend for the distribution of each of the following selling costs to sales departments and to territories:

a. Newspaper advertising?
b. National radio advertising?
c. Catalogues?
d. Selling salaries?
e. Travel?
f. Shipping?
g. Rent?
h. Property insurance?

7. Describe the procedure involved in the transfer of selling costs to sales departments and to territories and, finally, in the transfer of sales departments' costs to territories.

8. What base or bases would you consider the most equitable for the distribution to territories of the following sales departments' selling costs:

a. Advertising department?
b. General sales department?
c. Dealer and jobber service?
d. Adjustment department?
e. Shipping department?
f. Sales accounting department?

9. What journal entries are required at the end of the accounting period to transfer total selling costs to sales service departments, to territories, to territorial profit and loss accounts, and, finally, to the General Profit and Loss account?

10. What difficulties are encountered in the classification of distribution costs by salesmen? by customers?

11. Is an analysis of distribution costs by sales orders a practical costing procedure for the majority of companies? Of what significance is such an analysis?

12. What are territorial application rates for selling costs? How are they computed? How are they employed in applying selling costs to sales orders?

13. Name four methods that can be used in computing territorial application rates. Which methods are considered to be the most equitable?

14. Describe the procedure of determining distribution costs and profit or loss by lines of products. What difficulties and limitations are encountered in obtaining accurate cost figures for lines or classes of products?

15. What types of monthly statements can be prepared to inform management of distribution costs and profit or loss conditions for territories, salesmen, and products?

16. Delmars is a large and exclusive store handling fine foods and liquors and operating a restaurant. Its departmental classification comprises the following sales departments: groceries, meats, bakery goods, candies, liquors, delicatessen, and restaurant. The service departments are as follows: advertising, executive office, buying, delivery, credit, and warehouse.

Each sales department is operated as a separate unit with its own sales manager and sales personnel. Each department has a number, which identifies its sales tickets, purchase orders, invoices, supply requisitions, payrolls, telephone toll charges, and inventory sheets.

The records of original entry include a general journal, a sales journal, a sales return and allowance journal, a voucher register, and a check register. A physical inventory is taken and the books are closed each month.

Outline a plan of cost accounting for this concern.

17. Describe how the following business papers can be prepared or coded so that business transactions can be identified and classified by sales departments:

a. Sales tickets.
b. Credit memoranda for sales returns and adjustments.
c. Purchase orders and vendors' invoices.

18. What general ledger accounts and subsidiary records would you suggest be added to the financial accounting system in order to provide for the accumulation of income and costs by departments? Describe the debits and credits which will be made to each account.

19. What types of monthly statements should be presented to management to show the departmental operations for the period? Describe alternative methods of presenting cost data.

20. Explain how you would analyze the results shown in the comparative profit and loss statement. What ratios would you compute? What recommendations can you make in regard to the profit and loss statement of the Vogue Store for Women, Exhibit 117, page 398?

21. Discuss in detail the general procedure used in determining costs, sales, and

profit or loss for lines of merchandise in small retail establishments. How does the accounting procedure differ as compared to methods employed in determining profit or loss for sales departments in department stores?

22. What conclusions can be drawn from an analysis of the profit and loss statement of the Central Lumber and Hardware Co., Exhibit 118, page 402?

Problem 1

The Jackson Co. employs three salesmen, Herbert, Adams, and Parsons. Part of the sales volume is due to direct sales which are received without the services of a salesman; these sales are known as "house sales." The sales income is from a single product that is produced at a uniform factory cost per unit.

The following information is available for the year: net sales: Herbert, $100,000; Adams,$60,000; Parsons, $40,000; and house sales, $210,000. Cost of goods sold averages 50% of net sales. Advertising costs for the year were $42,000; general selling costs totaled $36,000.

Herbert is paid a salary of $3,000 and a commission of 5% on his sales; Adams receives a salary of $2,000 and a commission of 5% on sales; Parsons is employed on a straight commission basis, his commission being 10% on sales.

An analysis of travel costs provides the following: Herbert, $4,260; Parsons, $881; and Adams, $2,150.

One-half of the advertising and general selling costs are charged against house sales and the balance is charged to the salesmen in proportion to their sales.

Required:

a. A comparative profit and loss statement showing the net profit for each salesman and house sales and total net profit for the company.

b. Recommendations regarding more equitable cost distribution bases for advertising and general selling costs.

Problem 2

The Wayne Mercantile Co. distributes three lines of canned goods, designated as A, B, and C. The company does not maintain a territorial classification of sales and selling costs, but closes the sales, sales adjustments, cost of goods sold, and selling cost accounts to profit and loss accounts by lines of products. The following schedule shows data which have been directly identified with lines of products for the month of January:

	Product A	Product B	Product C	Total
Sales	$20,000	$45,000	$32,000	$97,000
Sales returns and allowances	1,000	3,000	2,000	6,000
Sales discounts	200	400	500	1,100
Direct advertising	500	1,200	400	2,100
Salesmen's salaries	200	500	250	950
Salesmen's commissions	100	400	60	560
Warehouse costs	150	225	175	550
Shipping costs	175	200	240	615
Freight-out	250	475	350	1,075
Estimated gross profit on net sales	40%	35%	25%	

Sales discounts are considered a reduction in sales in determining net sales. General selling costs which cannot be directly identified with lines of products include general advertising, $1,500; general sales salaries, $1,200; sales office costs, $800. The general selling costs are apportioned to lines of products on the basis of the estimated gross profit on net sales. It may be assumed that all costs are vouchered and paid.

a. Prepare journal entries to record all transactions for January.

b. Give your appraisal of the company's method of apportioning general selling costs to lines of products. What other method or methods would you consider to be more equitable for each selling cost?

Problem 3

The Stettler Sporting Goods Co. is a wholesale distributor of athletic goods, fishing equipment, and hunting equipment, including firearms and ammunition, through its own salesmen in three territories designated as follows: Territory 1, North Central; Territory 2, Central; and Territory 3, South Central.

The company has the following three service departments in the central office in Denver: executive office, which is responsible for purchasing, personnel, and general supervision; sales promotion, which is responsible for advertising and displays; and office service, which handles the accounting and statistical work. The president has requested that the books be closed each month and that comparative statements be prepared to show the profit or loss for each line of products and for each territory. The classification of accounts includes the following accounts: Sales, Merchandise Inventory, Selling Cost Control, Executive Office, Sales Promotion, Office Service, Profit and Loss—Territory 1, Profit and Loss—Territory 2, Profit and Loss—Territory 3, and General Profit and Loss. The analysis of profit and loss by lines of products is not shown in the general ledger accounts but is shown on an analysis sheet each month.

The analysis of sales for the month of September, is given below:

Line of products	Territory 1	Territory 2	Territory 3	Total
Athletic goods	$15,000	$20,000	$ 5,000	$ 40,000
Fishing equipment	10,000	20,000	4,000	34,000
Hunting equipment	5,000	10,000	11,000	26,000
Total	$30,000	$50,000	$20,000	$100,000

The gross profit, based on an analysis of pricing, is estimated to be 15% of sales for athletic goods, 20% of sales for fishing equipment, and 25% of sales for hunting equipment.

Selling costs	Territory 1			Territory 2			Territory 3		
	Athletic goods	Fishing equipment	Hunting equipment	Athletic goods	Fishing equipment	Hunting equipment	Athletic goods	Fishing equipment	Hunting equipment
Salesmen's commissions	$ 750	$ 800	$500	$1,000	$1,600	$1,000	$250	$300	$1,100
Newspaper advertising	100	150		150	75		50		200
Billboard advertising	80			160			80		
Display advertising	40	60		50	120		25	20	100
Supplies	18	8	12	10	12	8	5	5	15
Telephone and telegraph	20	10		12	6				16
Payroll taxes	30	32	20	40	64	40	10	12	44
Total	$1,038	$1,060	$532	$1,422	$1,877	$1,048	$420	$337	$1,475

An analysis of selling costs that are directly assignable is given on page 576.

All merchandise is shipped f.o.b. Denver. Salesmen are paid commissions, varying with the type of items sold. Salesmen pay their own travel.

A summary of selling costs for service departments shows the following: executive office, \$2,700; sales promotion, \$3,000; office service, \$3,300. The executive office and office service costs are considered to be distributable equally to the territories in determining territorial profit or loss and equally to lines of products in computing profit or loss by lines of products. Sales promotion costs are to be allocated on the basis of sales in each profit and loss computation.

a. Prepare journal entries to close the books as of Sept. 30, transferring the profit or loss for each territory to the General Profit and Loss account.

b. Prepare comparative profit and loss statements to show the profit or loss for each territory and for each line of products.

c. Present comments and recommendations.

Problem 4

The Kellar King Distributing Co., distributors of a standard dry food line, shows the following results for the month of April:

	Territories			
	Southwest	South	Southeast	Total
Net sales	\$50,000	\$100,000	\$40,000	\$190,000
Distributing costs	40,000	70,000	36,000	146,000
Number of cases sold	10,000	35,000	10,000	55,000

a. Compute territorial application rates for each territory by the net sales method.

b. Do the same as in *a*, by the "quantity to be sold" method.

c. Using the rates computed in *a* and *b*, determine the amount of distribution costs to be added to an order received in each territory for 250 cases with a total sales price of \$1,000.

Problem 5

The Wallace Machine Co. manufactures automatic drill presses. A job order system is used to record the costs of the machines, which are produced when orders are sent in by the company's six salesmen working in three trade territories. Distribution costs are recorded by sales service departments and trade territories. At the end of each month a detailed analysis is made of distribution costs and of profit or loss for territories and salesmen.

Sales service departments include general sales office, advertising, order, and billing. Salesmen and territories are listed as follows: Allen, Barker, and Christie in the Seattle territory; Dugan and Elder in the San Francisco territory; and Fisk in the San Diego territory. The schedule on page 578 is an analysis of sales, costs, and salesmen's activities for September.

a. Prepare a comparative statement of selling costs for sales departments, territories, and salesmen for the month ended Sept. 30. (Indicate the bases used in apportioning costs.)

b. Prepare a comparative profit and loss statement for territories and salesmen for the month ended Sept. 30.

ANALYSIS OF SALES, COSTS, AND SALESMEN'S ACTIVITIES FOR SEPTEMBER

	General sales office	Advertising dept.	Order dept.	Billing dept.	Seattle			San Francisco		San Diego
					Allen	Barker	Christie	Dugan	Elder	Fisk
Net sales					$165,000	$155,000	$150,000	$120,000	$115,000	$180,000
Cost of goods sold					130,400	122,500	118,600	94,500	90,500	142,400
Salaries	$1,000	$600	$700	$800	350	325	300	350	325	350
Commissions					400	375	275	225	225	200
Travel					100	150	125	175	200	150
Advertising		750			75	75	75	100	100	125
Telephone and telegraph					30	25	20	35	30	25
Property taxes	100	75	75	50						
Depreciation	50	75	25	10						
Payroll taxes	20	12	16	8	14	13	12	14	13	14
Heat and light	30	13	9	7						
Supplies	25	50	15	10	11	12	13	11	12	11
Insurance	15	20	10	5						
Number of customers					20	25	25	15	20	30
Number of orders					35	30	25	25	20	35
Number of invoices					65	60	55	50	45	70
Mileage traveled					2,000	3,000	2,500	3,500	4,000	2,750
Number of calls					70	90	75	80	100	175

Problem 6

The St. Paul Hardware Co. is a retail establishment selling hardware, paint, and power tools. The company operates as a departmental organization and segregates purchases and sales elements by departments through the media of sales tickets, purchase orders, purchase returns and sales returns debit and credit memoranda, and columnar records of original entry.

The management is interested in obtaining information concerning costs and the profit or loss for each department for the month ending Mar. 31.

In support of the Selling Cost Control account in the general ledger are the following subsidiary ledger accounts and their balances on Mar. 31:

Account	Dr.
Supplies	$ 100
Payroll taxes	180
Rent	300
Delivery costs	1,200
Bad debts	500
Depreciation of store equipment	80
Telephone and telegraph	20
Salaries and commissions	6,000
Advertising	2,000
Property taxes	150
Fire insurance	25
Office costs	3,000
Purchasing costs	4,000

An analysis of inventory sheets, sales tickets, and purchase orders made possible the preparation of the following classification by departments:

	Hardware	Paint	Power tools	Total
Inventory, Mar. 1	$ 9,000	$12,000	$4,000	$ 25,000
Purchases	35,000	40,000	5,000	80,000
Sales	46,500	44,000	9,500	100,000
Inventory, Mar. 31	14,000	20,000	1,000	35,000

The following bases are selected for the distribution of costs to departments: supplies, bad debts, telephone and telegraph—sales; property taxes and fire insurance—average inventory value of merchandise; office costs—equally; purchasing costs—purchases; payroll taxes—salaries and commissions.

A survey of service rendered is the basis for the following apportionment of costs:

Costs	Hardware, %	Paint, %	Power tools, %
Rent	45	35	20
Delivery	25	40	35
Depreciation of store equipment	55	20	25
Salaries and commissions	55	35	10
Advertising	70	20	10

Required:

a. Journal entries to close the books as of Mar. 31, using a separate profit and loss account for each department and a general profit and loss account.

b. Comparative profit and loss statement showing profitableness of each department.

c. Comments about business operations, supported by important operating ratios.

d. Recommendations regarding more equitable cost distribution bases.

Problem 7

Pennock Bros., a men's clothing store, uses the following sales department classification: clothing, hats, shoes, and sportswear; and two service departments as follows: general office and delivery. The books are closed and statements are prepared each

Accounts and subsidiary data		Dr.	Cr.
Cash		$ 22,000	
Accounts receivable		4,400	
Building (20-year life)		30,000	
Land		10,000	
Vouchers payable			$ 3,000
Prepaid insurance		480	
Truck (5-year life)		2,000	
Accumulated depreciation—building			4,500
Accumulated depreciation—truck			800
Sales control			72,000
Clothing	44,000		
Hats	6,000		
Shoes	18,000		
Sportswear	4,000		
Purchases control		53,400	
Clothing	$38,000		
Hats	2,000		
Shoes	10,000		
Sportswear	3,400		
July 1, inventory		36,000	
Clothing	$22,000		
Hats	4,000		
Shoes	8,000		
Sportswear	2,000		
Operating costs control		27,765	
Salaries	$24,000		
Bad debts	280		
Contributions	180		
Truck costs	675		
Advertising	1,200		
Utility costs	600		
Telephone	240		
Office supplies	350		
Insurance	240		
Capital stock			40,000
Earned surplus			65,745
		$186,045	$186,045

quarter. The account balances and subsidiary ledger data on page 580 are prepared as of Sept. 30 for the third quarter of the year.

Additional information:

1. Inventory, Sept. 30:

Clothing	$34,000
Hats	2,400
Shoes	9,600
Sportswear	2,600

2. Analysis of salaries shows:

Clothing	$ 4,000
Hats	3,600
Shoes	3,000
Sportswear	3,000
General office	8,000
Delivery	2,400

3. Analysis of advertising shows the following column inches used per department:

	Column Inches
Clothing	1,200
Hats	200
Shoes	600
Sportswear	400
	2,400

4. Truck costs are charged to the delivery department; telephone, office supplies, and contributions are transferred to the general office department.

5. Depreciation—building is allocated on the basis of floor space as follows:

	Square Feet
General office	120
Clothing	600
Hats	60
Shoes	240
Sportswear	180
	1,200

Depreciation—truck is charged to the delivery department.

6. Insurance is distributed to departments on basis of floor space.

7. Utility costs are distributed to sales departments on the basis of net sales after 10% has been allocated to general office department.

8. Delivery department costs and general office costs are distributed on the basis of net sales.

9. Bad debts are considered as a nonoperating expense.

a. Prepare closing journal entries.

b. Present a comparative departmental profit and loss statement for the quarter.

c. Submit a balance sheet as of Sept. 30.

d. Analyze the profit and loss statement; include the operating ratios that you consider important and give your opinion regarding the departmental operations.

e. Comment regarding the equitableness of the distribution methods used for operating costs and service departments.

Problem 8

The Johnson Meat Packing Company desires to study its distribution costs (selling, administrative, and general expenses) which in the aggregate constitute 65% of the total cost of doing business. From the information following, prepare an exhibit showing the allocation of total distribution cost per cwt. of meat products for each size-class of order (expressed in pounds per order). Carry out unit costs to hundredths of a cent.

An analysis made to determine basic causes of cost variation in selling, administrative, and general expense items discloses that each element of expense varies according to one of the following three bases: (1) number of orders; (2) number of items or invoice lines per order; and (3) weight of order expressed in cwt. Expenses varying according to these three factors account for the total distribution cost of a given order.

The analysis of each class of distribution expense discloses that these expenses are attributable to each of these three factors as follows:

Distribution cost controls	Expenses based on			
	Number of orders	Number of items	Number of cwt.	Total
Selling expense control	$2,310	$1,080	$ 210	$3,600
Packing and delivery expense control	260	320	620	1,200
Administrative and general expense control	1,170	580	340	2,090
Total distribution cost	$3,740	$1,980	$1,170	$6,890

Data by order-size classes follow:

Order-size class	Number of orders	Total number of items	Total cwt.
Under 50 pounds	2,800	4,090	700
50–199 pounds	2,900	8,410	2,610
200–499 pounds	600	2,280	1,860
500–999 pounds	400	2,400	2,800
1,000 pounds and over	100	820	1,030
All orders	6,800	18,000	9,000

(Uniform Certified Public Accountant Examination, November, 1945)

Problem 9

Prepare a schedule showing sales, costs, and operating net income for each line of goods distributed by the Argo Grocery Company. Furnish supporting schedules indicating clearly how the items of expense have been apportioned. Show results only to the nearest dollar.

The Argo Grocery Company manufactures and distributes in a limited area two lines of grocery products. One line is distributed to hotels and restaurants, the other to retail grocers. Selling organizations for the two lines are separately set up and operated, and there is considerable rivalry between them. There is also a good deal of argument about which line nets the greater income to the company. Total dollar volumes of the two lines are roughly equal, but on account of competitive conditions the margins in the restaurant line are relatively narrow while wider margins are enjoyed by the retail line. From this fact the sales manager for the retail line argues that his line contributes more to the company's net income. The restaurant sales manager, however, insists that the distribution costs per dollar of sales for his line are sufficiently lower to make up for the difference in margin.

In an attempt to settle the argument the following facts about the company's 1940 business have been ascertained:

Both lines are stored in a single warehouse, and packing and shipping activities are carried on by the same crew. The restaurant line consists of ten items and is sold in shipping containers supplied by the factory and included as part of factory cost. The retail line consists of fifty items. The goods must be assembled and packed in containers after orders are received. Time studies indicate that it takes about four times as long to prepare $100 worth (at selling price) of retail goods for shipment as in the case of restaurant goods. Restaurant goods are delivered at the warehouse dock to customers' trucks or to common carriers; in the latter case the customers pay the freight. The company's own delivery equipment is used entirely for the retail line.

Advertising is directed entirely at the ultimate consumer, with the aim of persuading him to demand the company's products at stores and in public eating places. It consists of newspaper advertising and of display matter and leaflets supplied to dealers. About 10 per cent as much newspaper space is devoted to the restaurant line as to the retail line. The company's advertising staff consists of one man, who spends two thirds of his time on newspaper advertising and the balance on display and leaflet material.

Schedule 1 lists the operating expenses of the company other than those concerned with manufacturing. Schedule 2 lists important operating data ascertained in the course of your investigation. The apportionment of office and clerical time is the result of time studies and estimates. It is the opinion of the management that office supplies and equipment expense roughly parallels the office and clerical salaries. The management rejects as inadmissible the inclusion of interest on investment. Approximately one half of the time of credit and collection employees is spent in routine checking orders for credit approval. The balance is spent on credit follow-ups and attempts to collect specific accounts. Experience indicates that the average retail account is about five times as likely to require such collection effort as the average restaurant account. Historical records show that about ½ of one per cent of retail sales are never collected, while only $\frac{1}{10}$ of one per cent of restaurant sales prove to be uncollectible.

Ninety per cent of the job of keeping warehouse stock records is concerned with shipments and 10 per cent with receipts from the factory. All items of the restaurant line are received at the warehouse every day, but items in the retail line are received on the average only every other day.

SCHEDULE 1

EXPENSE DATA

Sales force salaries and expense:	
Restaurant line	$15,000
Retail line	35,000
Warehouse depreciation, insurance, etc	4,000
Packing and shipping wages	10,000
Shipping containers	800
Other shipping supplies (proportionate to number of sales invoices)	600
Delivery wages, supplies, and expense	3,000
Newspaper advertising	11,000
Display material and dealers' helps	2,500
Advertising salary	1,650
Office and clerical salaries (see schedule 2)	5,000
Office supplies and equipment expense	1,600
Executive salaries and expense (apportion on basis of sales)	8,000
Bad debts allowance	1,590
Total	$99,740

Schedule 2
Operating Data

	Restaurant	Retail
Sales	$240,000	$270,000
Factory cost of sales	$200,000	$180,000
Warehouse space occupied by $100 worth, at cost	30 cu. ft.	60 cu. ft.
Average inventory, at cost	$ 20,000	$ 40,000
Number of sales invoices	1,000	9,000
Average number of items per invoice	4	12
Number of customers	28	224
Average customers' accounts outstanding	$ 20,000	$ 40,000
Analysis of office and clerical time:		%
Keeping warehouse stock records		5
Preparing order and sales invoice forms		25
Posting sales invoices		15
Receiving cash and posting cash receipts		5
Preparing customers' statements		5
Credit and collection activities		10
General accounting and clerical (apportion on basis of sales)		35
		100

(Uniform Certified Public Accountant Examination, November, 1941)

CHAPTER XX

Questions

1. What difficulties are encountered in developing a plan of standard cost control in the distribution division which is comparable with standards in the manufacturing division?

2. Is it your opinion that standard costs should be incorporated as a part of the managerial control of distribution functions? Discuss.

3. What are the chief objectives in determining standards for distribution functions? What general procedure is followed in setting standards?

4. How are standards for sales established? What are sales quotas? What forms of sales quotas may be used? How may sliding-scale budgets be used?

5. Describe the procedure of determining standards for each of the following selling costs:

a. Advertising.
b. Selling salaries.
c. Travel.
d. Supplies.
e. Telephone and telegraph.
f. Delivery costs.

6. How are standards set for sales territories? Give the formula for the computation of the standard selling cost rate for a territory when net sales is used as a basis. What bases other than net sales can be used?

7. Describe the accounting procedure for standards for sales territories.

8. Describe the process and mention the records that you would use in investigating and analyzing the variances from standard costs for territories.

9. What reasons can you name for the existence of these variances?

10. What disposition would you recommend for variances resulting from each of the causes that you mentioned in Question 9?

11. Describe the process of setting standards for salesmen.

12. Is it practical and of value to management to set standards for products? for sales orders? for customers' accounts? Explain.

13. What types of standard distribution cost statements may be prepared? How may such statements be used by management for purposes of control?

Problem 1

The Howey Sales Co. uses the following standard selling cost application rates based on standard sales:

Territory A	7%
Territory B	4%
Territory C	5%
Territory D	9%

During March results were as follows:

Territory	Net sales	Cost of goods sold	Actual selling costs
A	$80,000	$70,400	$8,000
B	55,000	50,800	1,800
C	70,000	60,500	4,000
D	20,000	17,500	3,000

a. Prepare journal entries to record the above information for March and to set up variance accounts.

b. Prepare a comparative profit and loss statement for March. Variance in Territory A is considered to be due to inefficiency; other variances are due to seasonal causes.

Problem 2

At the close of the second quarter of the year the comptroller of the Arnold Co. investigated the balance in the Selling Cost Variance account in order to determine underlying causes. His survey of the subsidiary records revealed the following:

1. Salesman Jones drove an extra 1,500 miles to settle a complaint of a good customer who had been forced to pay a penalty under a contract for the resale of goods because the shipping department of the Arnold Co. had incorrectly routed the order. Cost of extra mileage, $120.

2. A strike at a local newspaper publisher that carries a substantial amount of Arnold Co. advertising resulted in a reduction in advertising cost of $1,200.

3. A small fire in the packing and shipping department resulted in a loss of special packing material of $2,300. (Not covered by insurance.)

4. Long-distance telephone toll charges were $3,000. This amount exceeded the average monthly charge by $2,000 but was expected during this period of the year, when a large number of orders were received by telephone. Consideration had been given to this situation when the standard budget was prepared.

5. The delivery department had been charged $1,700 for air freight. This extra amount of shipping cost was required because the sales department misplaced and delayed action on a sales order received from a good customer.

6. Branch office rent reflected a savings of $1,000 resulting from the closing of three branches.

7. Catalogues for distribution throughout the year were received from the printer. The expenditure totaled $26,000.

8. Additional warehouse costs totaled $4,000 as a result of the purchasing department's overstocking of raw materials.

Required:

Journal entries to record each transaction as an adjustment of the Selling Cost Variance account. Give the reason for your disposition of the particular item as an explanation to each journal entry.

Problem 3

The William Wood Co. manufactures and sells school equipment and supplies to jobbers throughout a 10-state area. A standard cost system is employed. The following information is available:

Salesman	Standard selling costs for year	Standard sales quota for year	Actual sales for April	Actual selling costs for April	Standard cost of goods sold
Ament	$ 8,000	$100,000	$12,000	$1,000	$ 9,600
Jones	6,000	60,000	4,000	400	3,600
Sauer	9,000	150,000	10,000	800	8,500
Deterding	7,000	40,000	5,000	700	3,500
Munns	7,500	40,000	3,000	500	2,700
Miller	8,500	42,500	15,000	900	11,000
Trippe	5,000	65,000	2,000	400	1,700
Spencer	9,500	50,000	6,000	1,200	5,000
Totals	$60,500	$547,500	$57,000	$5,900	$45,600

a. Compute the standard selling cost application rate for each salesman.

b. Using the rates determined in *a*, prepare a comparative salesmen's profit and loss statement for the month of April.

c. Submit a schedule showing the variance between the monthly applied standard selling costs and actual selling costs for each salesman.

d. Formulate a policy for the disposition of monthly variances from standard selling costs, assuming various causes for the variances.

Problem 4

The Hudson Supply Co. sells machine tools to manufacturers located in the eastern part of the United States. The area is divided into three territories designated as I, II, and III. The company purchases its tools on a contract basis at selling price less 25%. The following budget standards have been set for the territories for the year:

	Territory I	Territory II	Territory III
Sales	$240,000	$180,000	$180,000
Salesmen's salaries	$ 9,000	$ 9,000	$ 9,000
Salesmen's commissions	2% of sales	2% of sales	2% of sales
Advertising	1½% of sales	2% of sales	1% of sales
Auto travel (8¢ per mile)	120,000 miles	84,000 miles	120,000 miles
Meals and lodging ($10 per day)	936 days	864 days	936 days
Sales administrative costs (survey)	$ 6,000	$ 4,200	$ 4,200
No. of salesmen	3	3	3

1. The actual credit sales for May:

Territory I	$22,000
Territory II	14,000
Territory III	18,000
Total	$54,000

2. The total salesmen's salaries for all territories were $2,250 and their commissions amounted to $1,080.

3. The actual cost of advertising for the month for each territory:

Territory I	$275
Territory II	175
Territory III	225
Total	$675

4. The total auto travel based on miles for each territory:

Territory I	10,375 miles
Territory II	6,250 miles
Territory III	11,875 miles

5. In Territory I, salesmen spent 80 days on the road:

Salesman 1	25 days
Salesman 2	28 days
Salesman 3	27 days
	80 days

In Territory II, salesmen spent 65 days traveling:

Salesman 4	20 days
Salesman 5	28 days
Salesman 6	17 days
	65 days

In Territory III, salesmen traveled for 85 days:

Salesman 7	29 days
Salesman 8	28 days
Salesman 9	28 days
	85 days

6. Actual sales administrative cost was allocated on the basis of a survey as follows:

Territory I	$ 525
Territory II	360
Territory III	375
Total	$1,260

All costs were vouchered and paid.

a. Compute the standard selling cost application rate for each territory for the year.

b. Prepare journal entries to record all transactions for May. (Assume that variances are due to seasonal conditions.)

c. Prepare a comparative territorial profit and loss statement for May.

Problem 5

The Mason Corp. bottles and distributes three lines of green olives, coded 1, 2, and 3, and the records of the company are set up to show sales by lines of products. Selling costs are distributed and profits and losses computed by individual lines of products.

The standard budget for the year exhibits the following information:

	Product 1	Product 2	Product 3
Estimated net sales	$240,000	$400,000	$600,000
Estimated selling costs	24,000	32,000	72,000

Estimated selling costs are distributed to each product on the basis of estimated net sales. Books are closed every month. Three sales service departments handle all selling functions: general sales office, advertising department, and shipping department. Service department costs cannot be directly identified with individual products and are allocated on the basis of net sales.

The following information has been accumulated but not recorded for July:

	Product 1	Product 2	Product 3	Total
Sales on account	$40,000	$72,000	$110,000	$228,000
Sales returns and allowances	2,000	4,000	6,000	12,000
Cost of goods sold	34,000	60,000	86,000	180,000
Salesmen's salaries	2,000	1,800	4,200	8,000
Salesmen's commissions	800	640	1,800	3,240
Shipping costs	400	380	840	1,620
Advertising costs	500	400	1,260	2,160
Freight-out	300	180	400	880

Service department costs that cannot be directly identified with individual products follow:

General sales office	$3,000
Advertising department	1,000
Shipping department	1,600
	$5,600

All costs are vouchered and paid.

a. Compute standard selling cost application rates for each product.

b. Record all transactions for July in general journal form.

c. Prepare a comparative profit and loss statement by lines of products, assuming that Product 1 variance is due to seasonal conditions, but that Products 2 and 3 variances are due to incorrect rates.

Problem 6

The Hoffman Machine Co. manufactures and sells electric floor waxers to wholesalers. A standard distribution cost system is used.

1. The standard manufacturing cost of the machine is as follows:

Material	$ 5.00
Labor	7.50
Factory overhead	2.50
Standard manufacturing cost	$15.00
Selling price	25.00

2. The standard distribution budget for the year beginning Jan. 1 shows:

	Salesman				Total
	Hanna	Smith	Miller	Prothe	
Sales quotas	$120,000	$90,000	$108,000	$72,000	$390,000
Selling costs	24,000	20,700	22,680	13,680	81,060

The company uses standard normal selling cost application rates computed on the basis of standard sales (quotas) in the preparation of monthly profit and loss statements.

3. The following actual data is available for July:

Salesman	Actual sales	Special advertising	Miles traveled	Per diem (no. of days)	Telephone and telegraph	Salaries	Supplies
Hanna	$11,000	$150	2,100	20	$100	$ 600	$ 75
Smith	9,000	100	2,000	28	75	500	50
Miller	7,500	100	1,800	20	80	450	25
Prothe	4,500	50	1,500	15	50	400	50
Totals	$32,000	$400	7,400		$305	$1,950	$200

In addition to their regular salaries, the salesmen are paid a commission of 5% of actual sales. They are reimbursed at the rate of $0.08 per mile for each mile traveled during the month and are given a per diem allowance for food and lodging while on the road. Hanna receives an allowance of $10 per day; the other salesmen receive $7 per day.

The costs of the home office for July, totaling $3,000, are apportioned to the salesmen on the basis of actual sales.

It may be assumed that all selling costs, including those of the home office, were vouchered and paid during the month.

a. Compute the standard selling cost application rate for each salesman.

b. Prepare journal entries for all transactions for July including the setting up of selling cost variances.

c. Prepare a comparative statement of selling costs by salesmen.

d. Prepare a comparative profit and loss statement by salesmen, assuming that the variances are due to seasonal conditions.

CHAPTER XXI

Questions

1. What difficulties are encountered in the control of administrative costs? Do you think that control of these costs is as important as the control of manufacturing and distribution costs? What forms of control would you suggest?

2. What three points of view are frequently advanced as to the proper relationship of administrative costs to the other two divisions of the enterprise and to the total cost to make and to sell the product? Which plan do you prefer?

3. What accounting procedure may be used to apply administrative costs to products as a separate charge?

4. What problems are encountered in applying administrative costs partly to the manufacturing and partly to the selling division of a business enterprise?

5. What objections can you suggest to the treatment of administrative costs as period costs?

6. What accounting procedure may be used to accumulate and classify actual administrative costs during and at the close of the accounting period?

7. What types of standards can be used in the administrative division of a business enterprise? Of what value are budgets in setting standards?

8. What procedure is followed in determining unit standards for the administrative division? What unit of measurement may be used for each of the following functions or departments: personnel, bookkeeping, dictation, welfare, credit, and traffic?

9. How may a standard administrative cost rate be computed? What purpose is accomplished by using a standard rate?

10. Describe the procedure required in accounting for standard administrative costs. What general ledger control accounts and subsidiary records would you recommend for the recording of actual administrative costs, standard costs, and variances from standard?

11. Describe the process of investigating and analyzing the variance between standard and actual administrative costs.

12. What reasons can you give for the incurrence of the variance?

13. What disposition should be made of the variance due to each of the causes that you mentioned in answering Question 12?

Problem 1

The Porter Electric Co. manufactures water pumps which are sold to retailers through direct-by-mail solicitation. The standard costs as shown in the company's budgets for the year are as follows: direct material cost, $70,000; direct labor cost, $100,000; direct labor-hours, 84,000; factory overhead costs, $68,000; selling costs, $60,000; administrative costs, $52,000; sales quotas: pumps to be manufactured and sold, 5,000; sales, $600,000.

The books are closed and statements prepared each month. Since the business is subject to seasonal variations in both costs and sales, the management wishes to charge a standard amount of selling and administrative costs to each monthly accounting period.

a. Compute a standard selling cost application rate, using two different methods.

b. Compute a standard administrative cost application rate, using two different methods.

c. Assuming that the credit sales for January consisted of 200 pumps at a total amount of $24,000, present journal entries to charge the Cost of Goods Sold account for the standard manufacturing, selling, and administrative costs, using one of the methods given in *a* and *b* above.

Problem 2

The York Co. manufactures for special order from customers. The company does not classify its costs by departments or its sales by territories, but employs a job order cost system with a standard overhead application rate for each of the three divisions of the business: manufacturing, distribution, and administration. The company's standard budgets for the year beginning Jan. 1 show the following estimated figures: factory overhead, $200,000; direct labor-hours, 250,000; net sales, $400,000; distribution costs, $60,000; and administrative costs, $40,000.

a. Compute a standard application rate for each of the three divisions of the business enterprise.

b. Apply the three standard rates to sales order 1401, which contains the following standard direct charges: material cost, $240; labor cost, $80; labor-hours, 64; selling price, $600.

c. Explain to the management why it is preferable in concerns that are subject to seasonal conditions of production and sales to charge sales orders with the standard cost of manufacturing, selling, and administration.

Problem 3

The Franklin Supply Co. manufactures and sells a desk pen and pencil set. The manager of the company wishes to establish standard selling cost and administrative cost application rates per dollar of sales for each sales territory for the year.

The following information is extracted from the annual standard budget:

1. Standard sales:

Territory	Number of Units
A	5,000
B	4,000
C	5,800
D	6,800

2. Standard manufacturing cost per unit, $17.20.
3. Standard selling price per unit, $25.
4. Standard selling costs: Commissions, 3% of sales in each territory. Travel, 8¢ per mile for territories as follows:

Territory	Miles
A	40,000
B	30,000
C	35,000
D	45,000

Direct selling costs:

Territory	Amount
A	$11,700
B	6,900
C	14,810
D	18,340

Advertising, $17,000; distributed by percentage of the number of units sold in each territory.

5. Standard administrative costs: Salaries, $8,800; distributed to territories according to the amount of standard sales in each territory. General office costs, $16,000; distributed equally to territories.

Direct administrative costs:

Territory	Amount
A	$4,100
B	275
C	6,560
D	9,050

a. Prepare a comparative territorial standard profit and loss statement for the year.

b. Compute standard distribution and administration application rates for each of the four territories.

Problem 4

The Meade Co. produces an electric knife sharpener which is sold to retail dealers. There are three sales territories: Houston, Salt Lake City, and Chicago. Salesmen in the Houston territory are Thomas, Graham, and Lawrence; in the Salt Lake City territory, Norman and Day; and in the Chicago territory, Coleman. The following standard budget is available for the year beginning Jan. 1:

1. Standard manufacturing cost for the electric knife sharpener:

Materials	$3.00
Labor, 1 hr. @ $1.00	1.00
Overhead, 1 hr. @ $1.00	1.00
Total standard manufacturing costs	$5.00
Selling price	10.00

2. Estimated number of units to be manufactured and sold, 120,000.

3. Standard sales data:

Salesman	Sales quotas	Salaries	Travel (miles)	Per diem allowances	Estimated No. of accounts	Estimated No. of transactions
Thomas	$ 280,000	$ 5,000	5,000	$10	120	400
Graham	235,000	4,750	7,000	8	90	300
Lawrence	235,000	4,500	8,000	8	60	200
Norman	187,500	5,000	6,000	10	120	400
Day	112,500	4,500	6,000	8	90	300
Coleman	150,000	5,000	8,000	10	120	400
	$1,200,000	$28,750	40,000		600	2,000

Per diem allowance to salesmen is made on the basis of 300 days a year; travel allowance is 8¢ per mile.

4. Other sales data: General sales manager's salary: $8,400, distributed equally to salesmen. Standard territory office costs distributed to salesmen on the basis of the sales quotas of each salesman to total sales quotas for each territory:

Houston	$14,000
Salt Lake City	12,000
Chicago	4,000

Standard home office selling costs: $60,000, distributed to salesmen on the basis of sales quotas of each salesman to total sales quotas for the year.

5. Standard administrative costs:

	Amount	Basis of distribution to salesmen
Accounting	$10,500	Number of transactions
General office	17,200	Equally
Collection	11,500	Number of accounts
Administrative salaries	34,000	Sales quotas

Following are actual sales and administrative data for the month ended Jan. 31:

1.

Salesman	Sales salaries	Meals and lodging	Travel
Thomas	$ 450	$ 275	$ 42
Graham	425	215	58
Lawrence	410	215	60
Norman	450	300	50
Day	410	205	50
Coleman	450	285	70
Totals	$2,595	$1,495	$330

2. General sales manager's salary, $700.
3. Territory office costs:

Houston	$1,200
Salt Lake City	1,000
Chicago	400

4. Home office selling costs, $4,145.
5. Administrative costs:

Accounting	$1,000
General office	1,320
Collection	300
Administrative salaries	4,200

6. 8,000 units were sold during January distributed as follows:

Thomas	1,600
Graham	1,200
Lawrence	800
Norman	1,500
Day	1,300
Coleman	1,600
	8,000

In addition to the customary accounts the general ledger contains the following special accounts for *each territory:* Sales, Selling Costs, Administrative Costs, Selling Cost Variance, Administrative Cost Variance, Standard Selling Costs, Standard Administrative Costs, and Profit and Loss. There are no accounts in the general ledger for salesmen.

Required:

a. A comparative statement showing standard selling costs and administrative costs for each territory and for each salesman. Show also standard selling and administrative application rates for salesmen.

b. A schedule of actual selling and administrative costs for territories and for salesmen, showing variances from total standard selling costs applied and total standard administrative costs applied for January. The same bases used for distributing standard costs for the year are to be used for distributing actual costs for January.

c. Entries in general journal form to record the selling and administrative costs for January and to set up variances.

d. A comparative profit and loss statement for territories and for salesmen for the month ended Jan. 31. Assume that any variances that may have arisen from production were due to seasonal conditions, that selling cost variances were due to seasonal conditions, and that administrative cost variances were due to efficiency or inefficiency.

Problem 5

The Central States Corp. manufactures and sells electric refrigerators and washing machines to retail establishments through its own salesmen. The refrigerator production and sale are restricted to two types: Model 100, a small box built for use in apartments, and selling for $100; and Model 200, a 7 cu. ft. box planned for a family of from three to six persons and selling for $150. Likewise, only two types of washing machines can be manufactured and sold: the Victory model, planned for apartment and small home use and selling for $75; and the Utility model, planned for general family use and selling for $125.

A survey of the concern discloses that a system of budgetary control has been in use for 5 years and that the cost accounting system provides for a classification of costs by the three divisions of manufacturing, selling, and administrative, so that budgetary estimates and actual costs can be compared monthly in accordance with these classifications.

In the manufacturing division, a system of process cost accounting is employed with cost accumulation in accordance with the four products manufactured, each of the four models being considered as a separate manufacturing process. There are four service departments which are considered distinctly manufacturing: planning, stockroom control, maintenance, and superintendent's office.

In the selling division, sales are classified by territories, salesmen, and lines of products, each model being considered a distinct line. Selling costs are classified by sales service departments, territories, and salesmen. The sales service departments comprise: sales supervision, advertising, shipping, and dealer service. Advertising forms include newspaper, radio, and direct by mail. There are five territories: Central with four salesmen, Eastern with three salesmen, Northern with two salesmen, Southern with two salesmen, and Western with three salesmen.

The administrative division comprises the following service departments: president's office, payroll, accounting (including cost accounting), supplies, personnel, credit and collection, and purchasing.

Assume that you are a cost accountant and have been employed to install a system of standard costs in the three divisions of the corporation to be used in connection with the concern's system of budgetary control and cost accounting.

Prepare a report for submission to the president containing the following:

a. A diagram or diagrams of the general ledger accounts and the flow of transactions involved in the operation of the actual cost and standard cost accounting system that you plan to install for the manufacturing, selling, and administrative divisions of the corporation.

b. In connection with the diagram or diagrams in (*a*) indicate the subsidiary records that you would recommend, including the data to be shown in each subsidiary form.

c. Explain briefly what standards you would recommend in each of the three divisions and explain briefly how each standard should be computed.

d. Indicate what statements or reports should be prepared monthly so that the executives will have the maximum information for the proper control and direction of the business enterprise. Prepare column headings or explain what data should be shown in each exhibit.

Problem 6

The H Manufacturing Company is engaged in manufacturing items to fill specific orders received from its customers. While at any given time it may have substantial inventories of work in process and finished goods, all such amounts are assignable to firm sales orders which it has received.

The company's operations, including the administrative and sales functions, are completely departmentalized. Its cost system is on a job order basis. Direct materials and direct labor are identified with jobs by the use of material issue tickets and daily time cards. Overhead costs are accumulated for each factory service, administrative and selling department. These overhead costs, including administrative and selling expenses, are then allocated to productive departments and an overhead rate computed for each productive department. This rate is used to apply overhead to jobs on the basis of direct labor hours. The result is that all costs and expenses incurred during any month are charged to the work-in-process accounts for the jobs.

a. You are to compare this system, as it affects inventory valuation, with the usual system for manufacturing businesses.

b. *You are to criticize the system as it affects inventory valuation and income* determination.

c. You are to state any justification which you see for the use of the H Company's system.

(Uniform Certified Public Accountant Examination, May, 1951)

CHAPTER XXII

Questions

1. What types of managerial problems require cost analyses? Describe briefly five areas of business activity that frequently require managerial decisions as to policy. Explain how a cost analysis may be helpful to management in each case.

2. What important factors must be recognized in making cost analyses?

3. What problems may arise in preparing estimates of costs? in preparing flexible budgets?

4. What is meant by segmentation of costs? Why is it important in cost analyses?

5. Describe and give an example of fixed, semifixed, and variable costs. How may each be shown on a graph?

6. Define differential costs. Describe the procedures to be followed in determining differential costs.

7. How may differential cost analysis be used to determine whether or not to accept an offer? to submit a bid? to replace machinery and equipment?

8. Give three examples, other than those given in Question 7, of the application of differential cost analysis to business situations with which you are familiar.

9. What two points of view may be considered regarding the treatment of the undepreciated value of old equipment in cost analyses for the purpose of formulating replacement policies? What arguments can you offer to support each point of view?

10. What is meant by contribution margin analysis? Is there a distinction between this concept and the direct costing concept?

11. What arguments can you offer to support the contribution margin approach?

12. What is meant by net profit analysis? Contrast it with the contribution margin approach.

13. Give an illustration of a business situation for which the net profit analysis would be the most appropriate. Describe a business proposal for which the contribution margin approach would be of value.

14. Explain how a comparative profit and loss statement would be prepared if contribution margin analysis is used; if net profit analysis is employed.

Problem 1

The Royal Realty Co. has made an offer to the Bowdish Manufacturing Co. to either sell it a factory building for $100,000 or lease the property to the Bowdish Co. for an annual rental of $12,000. The land has a value of $10,000 and the building of $90,000. If the building is purchased, remodeling will cost $20,000; however, if the building is leased, the Royal Realty Co. has agreed to make the leasehold improvements, pay the property taxes and insurances, and make necessary repairs. Annual costs, other than depreciation, are estimated as follows:

Property taxes...........	$2,000
Insurance...............	1,000
Repairs.................	1,750

The building has an estimated life of 20 years, and the salvage value is expected to cover only the cost of demolition. At the present time the amount required to purchase and remodel the building will yield 2.5% interest if invested in high-grade securities.

Required:

A cost statement showing the additional cost or saving in the annual cost of operation if the building is purchased as compared to leasing the structure.

Problem 2

The Barr Products Co. has a small electric pump which cost $2,000 and, although being used in production, has been fully depreciated in the accounting records. On Jan. 1 the company receives an offer of $750 trade-in value on the purchase of a new pump costing $2,100. The new pump has an estimated life of 10 years and a salvage value of $100. During the first year of operation no costs of maintenance are anticipated, and power costs of $400 are expected to be the same as those for the old pump. If the old pump is used for another year, maintenance costs are estimated at $300 and the trade-in value at the end of the year is expected to be $600.

Required:

a. A comparative study of the annual costs for the year for the old and new pumps.

b. Would you recommend that the trade-in be made now or deferred for 1 year? Explain.

Problem 3

The Dieterich Co. manufactures a patented lawn sprinkler. The company's flexible budget reveals the following market conditions and costs:

Output in units of finished product	Selling price per unit	Total semifixed costs	Total variable costs	Total fixed costs
60,000	$12	$150,000	$ 418,000	$142,000
120,000	11	150,000	818,000	142,000
180,000	10	170,000	1,278,000	142,000
240,000	9	170,000	1,578,000	142,000
300,000	8	200,000	1,778,000	142,000
360,000	7	200,000	1,902,000	142,000

a. Prepare a schedule showing the total differential costs and increments in revenue.
b. At what volume should the company set its level of production?
c. What selling price should be established in order to obtain the most profitable operations for the year?

Problem 4

The Messamer Valve Co. manufactures check valves with a cast body and a weighted rubber check valve. Up to this time the check valves have been purchased in quantity from the Harper Supply Co. The cost of the check valve has varied as a result of rubber market changes, and purchase contracts have been limited to a 3-month supply. The Messamer Co. has capital available for investment and has unused plant capacity. The board of directors has requested the cost accounting department to prepare a cost study comparing the differences in costs of buying the rubber check valve and of manufacturing it in the company's plant.

The budget for the second quarter is as follows:

Sales			$100,000
Less:			
Variable costs:			
Manufacturing	$40,000*		
Distribution	10,500		
Administration	500	$51,000	
Semifixed costs:			
Manufacturing	$ 8,000		
Distribution	3,000		
Administration	4,000	15,000	
Fixed costs:			
Manufacturing	$ 5,000		
Distribution	1,000		
Administration	15,000	21,000	87,000
Estimated net profit			$ 13,000

The cost accounting department estimates the following increases in costs if the check valve is manufactured:

	Variable	Semifixed	Fixed
Manufacturing	$7,500	$1,500	$4,000
Administration	None	1,500	1,500

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* Includes the cost of purchasing from a supplier of 50,000 check valves @ $0.33 each.

Required:

a. A cost statement showing the estimated net profit if a decision is made to manufacture the check valve.

b. Recommendations as to whether or not the proposed change is financially advisable.

c. What factors, other than finance, might be considered before making a decision to manufacture the check valve?

Problem 5

Assume that you are the manager of a branch plant of a large machinery repair business. One Friday when the president of your company from the home office is visiting you, a local oil driller comes into your office with this proposition. His machinery on drilling equipment in a nearby oil field has broken down. He will pay you $9,000 if you can have his machinery in operation again by Monday morning. If you can perform the task, he promises you all his future repair business. If you cannot do the work, he says he will go to a competitor in another town, where he is sure he can get the work done for $9,000.

The president of your company says to accept the offer if you can make a profit on the job; if you cannot make a profit, reject the offer.

Your chief mechanic informs you that material costing $4,700 will be needed and that 500 hr. of labor will be required. The men you assign to the job will work in shifts, will all be paid at the same rate, but will have to be paid overtime. The 500 hr. of labor will cost $5 an hour, *and at time and a half the total labor cost will be* $3,750. The company applies overhead to jobs at $2.50 per direct labor-hour.

If you accept this offer, the total direct labor for all production for the month, including this job, will be 8,500 hr. at a cost of $43,750; total fixed overhead costs for the month will be $20,000 regardless of whether the offer is accepted or rejected.

State whether you should accept or reject this offer. Explain all factors and the alternatives that should be considered in making the decision.

Problem 6

Clifton Metal Processors is currently operating a semiautomatic lathe which it is considering trading in for a fully automatic high-speed lathe. The old semiautomatic lathe cost $6,300, has a salvage value of $300, has an estimated life from date of purchase of 20 years, and has been in operation for 10 years. The new lathe will cost $22,000 and has an estimated salvage value at the end of 30 years of $1,000. The trade-in value of the old machine is $2,100. The following information applicable to each year of operation is available.

	Old lathe	New lathe
Estimated hours of operation each year	3,000	3,000
Average number of units completed each hour	10	30
Operator's hourly wage rate	$2	$3
Repairs and maintenance	600	400
Power	300	500

The company follows the policy of charging the undepreciated cost of replaced equipment over the estimated life of the new equipment in making the decision as to the replacement of equipment.

Required:

a. A schedule showing the average cost per unit of output for the new lathe as compared with the old lathe.

b. How many units must be produced by the new lathe in order for the savings to be equal to the cash outlay for the new lathe?

Problem 7

The Ewbank Manufacturing Co. is considering the replacement of a small drill press. The comptroller has requested the cost accounting department to make a comparative study of the costs of retaining the old press and acquiring a new press. He requests that the report be prepared to show nondepreciated assets as:

1. "Sunk costs," a loss not expected to be recovered from future operations.
2. Undepreciated value, less trade-in value added to cost of new equipment and total cost depreciated over expected life of new equipment.

The following data are available:

	Old press	New press
Cost	$2,000	$2,800
Repairs (annual)	200	25
Operating costs exclusive of depreciation	187	178
Estimated life, years	5	5
Estimated life remaining, years	2	5
Resale value when discarded	$ 500	$ 800
Trade-in value on new machine	700	

Required:

a. A comparative cost study of the old and new machines.

b. Book loss if the new machine is acquired.

c. Recommendations as to whether or not the replacement should be made at this time.

Problem 8

Last year the Arterburn Manufacturing Co. leased a large building for the purpose of manufacturing unassembled egg cases. Sales increased as anticipated, but when operations were sufficient to meet the demand, only one-half of the building was required for production. The president has proposed that a new product be manufactured in order to utilize the remainder of the building. A market can be developed for a standard unassembled wood packing case. Income and costs for the next 12 months are estimated as follows:

	Present operations	New operations	Total
Net sales	$98,000	$49,000	$147,000
Direct costs: Material	11,000	6,000	17,000
Labor	17,000	13,000	30,000
Variable manufacturing overhead	10,000	5,000	15,000
Direct distribution costs	9,500	14,500	24,000
Direct administrative costs	7,000	3,000	10,000

Fixed costs are expected to be $23,000 regardless of the scope of operations. If the fixed costs are allocated to the present and newly proposed operations by means of selected bases, the distribution would be

Present operations (old line)	$13,000
New operations (new line)	10,000

a. Using the contribution margin approach, prepare a statement showing the estimated contribution and the estimated net profit for the two lines.

b. Compute the profit or loss on the new line, using the net profit approach.

c. Would you recommend the expansion of the plant to include the new line? Explain.

Problem 9

The accounting records of the Platter Distributing Co. exhibits the following data for the 6-month period ended June 30, 19—:

	Northern territory	Southern territory	Western territory
Net sales	$180,000	$120,000	$300,000
Direct selling costs:			
Salesmen's salaries	10,000	12,000	10,000
Salesmen's commissions	2,000	1,500	2,500
Advertising	2,500	4,500	3,000
Supplies	1,500	2,000	2,000
Depreciation	2,500	3,000	2,800
Insurance	100	120	110
Taxes	200	400	300
Travel and entertainment	12,000	18,000	15,000

Gross profit represents 40% of net sales. Service department costs, allocated to the territories on the percentage of net sales basis, are as follows:

General sales office	$23,000
Advertising department	15,000
Credit department	10,000
Claims department	12,000

During the past 3 years the Southern territory has consistently shown a net operating loss, and the board of directors are considering the discontinuance of the territory. If the territory is discontinued, the service department costs will remain unchanged. Required:

a. A comparative territorial profit and loss statement using the net profit approach.

b. A comparative territorial profit and loss statement using the contribution margin approach.

c. Your recommendations regarding the Southern territory.

Problem 10

The Kaak Specialty Co. has five salesmen who work out of the Ohio Branch office. The following information is available for the Ohio Branch for the month of May:

Name	Net sales	Cost of goods sold	Commissions and travel
Spencer	$20,000	$15,000	$700
Schneider	40,000	37,000	600
Williams	10,000	6,000	400
Miller	30,000	24,000	500
Munns	20,000	18,000	600

Branch office costs of $15,000 are apportioned to the salesmen on the basis of percentage of cost of goods sold. This basis of apportionment has been adopted because of the difference in markup of the many items sold. The results of Schneider's activities are considered to be unsatisfactory, and the salesmanager has recommended that his services be discontinued. It is not expected that his sales will be absorbed by other salesmen. The comptroller contends that the method of apportioning branch office costs to salesmen is not equitable and is partly the cause of Schneider's poor record. As cost accountant for the company you are requested to present comparative data and recommendations.

Required:

a. A comparative salesmen's profit and loss statement, using the net profit approach.
b. A comparative salesmen's profit and loss statement, using the contribution margin approach.
c. Comments and recommendations.

Problem 11

The Kitchenware Manufacturing Co. produces the Easiway can opener and sells its entire output to jobbers. The summary budget for the last 3 months of the fiscal year, October, November, and December, provides the following estimates of sales and costs:

Sales: 400,000 units @ $0.90		$360,000
Variable costs:		
Manufacturing	$120,000	
Selling	20,000	
Delivery	5,000	$145,000
Semifixed costs:		
Manufacturing	$ 35,000	
Selling	12,000	
Administration	6,000	53,000
Fixed costs:		
Manufacturing	$ 40,000	
Selling	25,000	
Administration	50,000	115,000
Total estimated costs		$313,000
Estimated net profit		$ 47,000

On Sept. 1, the sales manager enthusiastically presents to the board of directors a promotional plan which provides for the packaging of an attractive kitchen utility knife with each Easiway can opener. The knife is to be given away as a means of stimulating sales. The purchasing agent has submitted a report that the knives can be purchased and delivered in quantities of 50,000 or more at a net cost of $0.11 each. The market research department has prepared a report that an increase in sales of 100,000 units over the original sales estimate of 400,000 units can be expected for the 3-month period if the kitchen knife is packaged as a gift with the can opener.

The cost department presents the following estimates of *additional* costs, exclusive of the cost of the knives, that may be expected if the sales promotional plan is accepted:

Variable costs:		
Manufacturing	$24,000	
Selling (including packaging)	4,000	
Delivery	500	$28,500
Semifixed costs:		
Manufacturing	$ 1,500	
Selling	2,000	
Administration	1,000	4,500
Fixed costs:		None
Total estimated additional costs		$33,000

Assume that as the cost accountant for the company you have been asked to prepare a report with an analysis of the proposal of the sales manager.

a. Submit comparative statements of income and costs of the original and the proposed manufacturing and sales programs showing differential costs, average costs per unit, and net profit.

b. What are your recommendations in this case and your reasons for your decision?

c. What factors other than net profit or loss should be considered in making the final decision regarding the sales promotional plan?

Problem 12

The Metal Products Co. manufacturers three different models of a single product. From the following data you are to prepare a schedule, supported by computations, showing the sales quantity and sales dollar figure for each model necessary to enable the company to cover its non-variable costs.

Model Number	Annual sales budget (units)	Budgeted unit sales price	Budgeted sales allowances for a year
100	30,000	$15.00	$1,200
200	16,000	18.00	480
300	10,000	25.00	410

1952 Estimates

Model number	Quantity budgeted for production	Over-all estimated cost per unit		
		Total	Variable cost	Non-variable cost
100	30,500	$15.072	$ 9.871	$5.201
200	15,000	17.335	10.250	7.085
300	10,000	23.756	15.436	8.320

(Uniform Certified Public Accountant Examination, May, 1952)

Problem 13

The Rheta Rose Manufacturing Co. produces an item which it sells direct to consumers under its own brand. The item sells at $12.50 per unit, which is a long-established price. Due to a general decline in business activity, sales are currently being made at the rate of 5,000 units per month, which is only 40% of the normal productive capacity of the plant of the company.

An analysis of the costs of the company for a recent month, during which 5,000 units were produced and sold, shows the following:

Manufacturing Costs	
Direct labor	$12,375
Superintendent's salary (F)	1,000
Assistant superintendent's salary (F)	750
Power purchased	700
Direct materials	5,000
Purchased parts	3,000
Depreciation of building (F)	1,420
Maintenance of building (F)	206
Heat and light (F)	348
Indirect labor (F)	2,240
Miscellaneous supplies	1,000
Depreciation of machinery (F)	3,640
Repairs of machinery	600
Property taxes (F)	600
Insurance (fire) (F)	80
Social security taxes	555
Miscellaneous (F)	1,120
	$34,634

Selling Costs	
Manager's salary (F)	$ 834
Salesmen's commissions (F)	18,750
Travel (F)	247
Advertising (F)	500
Clerical salaries	300
Packing and shipping (F)	2,108
Miscellaneous (F)	1,203
	$23,942

Administrative and General Costs	
Officers' salaries (F)	$1,525
Office salaries (F)	975
Telephone and telegraph (F)	217
Supplies (F)	486
Bad debts (F)	625
Miscellaneous (F)	394
	$4,222

An offer has been received from a chain store by the treasurer of the company to purchase 5,000 units a month of the products with only immaterial modifications, to be shipped F.O.B. factory and billed to the individual stores. The items would be sold under the store's label and would be packed and shipped as directed by the chain at their expense. They offer $7 per unit unpacked on the basis of a one-year contract.

The management of the Rheta Rose Co. does not expect that there will be an improvement in the business within the next year, and there is no fear that the sale of the items to the chain would reduce the present volume of sales to consumers. The company does not believe it can afford to accept the offer, as it is losing on its present price of $12.50; therefore, it appears that losses would be substantially increased by entering into the sales contract with the chain.

Required:

Prepare an analysis which will show the result of accepting the order in comparison with the result if the order is not accepted. In preparing your analysis the items marked (F) are to be considered fixed and all others are to be considered variable with the number of units produced, except Selling Costs, Clerical Salaries which are semi-fixed and expected to increase 50% as a result of billings to the individual chain stores.

(Adapted from Uniform Certified Public Accountant Examination, May, 1942)

Problem 14

The D. P. Manufacturing Company produces one principal product. The income from sales of this product for the year 1950 is expected to be $200,000. Cost of goods sold will be as follows:

Materials used	$40,000
Direct labor	60,000
Fixed overhead	20,000
Variable overhead	30,000

The company realizes that it is facing rising costs and in December is attempting to plan its operations for the year 1951. It is believed that if the product is not redesigned the following results will be obtained:

Material prices will average 5% higher and rates for direct labor will average 10% higher. Variable overhead will vary in proportion to direct labor costs. If sale price is increased to produce the same rate of gross profit as the 1950 rate, there will be a 10% decrease in the number of units sold in 1951.

If the product is redesigned according to suggestions offered by the sales manager, it is expected that a 10% increase can be obtained in the number of units sold with a 15% increase in sale price per unit. However, change in the product would involve several changes in cost.

A different grade of material would be used but 10% more of it would be required for each unit. The price of this proposed grade of material has averaged 5% below the price of the material now being used and that 5% difference in price is expected to continue for the year 1951. Redesign would permit a change in processing method enabling the company to use less-skilled workmen. It is believed that the average pay rate for 1951 would be 10% below the average for 1950 due to that change. However, about 20% more labor per unit would be required than was needed in 1950. Variable overhead is incurred directly in relation to production. It is expected to increase 10% because of price changes and to increase an additional amount in proportion to the change in labor hours.

Assuming the accuracy of these estimates, you are to prepare statements showing the prospective gross profit if:

a. The same product is continued for 1951.

b. The product is redesigned for 1951.

(Uniform Certified Public Accountant Examination, May, 1951)

Problem 15

The H & H Laboratories, Inc., manufactures the chemical product *Zoom* sold to the automobile industry at $4.25 a pound. The manufacturing process is departmentalized as follows:

Department 1—mixing
Department 2—cooking
Department 3—cooling
Department 4—packing

Materials X, Y and Z are issued from stores twice daily for production runs, which are controlled by number and date.

In Department 1, materials X, Y and Z are weighed and mixed in accordance with a secret formula. In Department 2 the mixture is cooked and 10% of the mixture is lost in evaporation at the end of the departmental process. The cooking process requires several hours, and immediately upon completion the vats containing the remaining 90% of the mixture are conveyed on belts through several rooms of different temperatures comprising the cooling department. In the final stages of this department, the top 80% of the mixture is poured out and transferred to Department 4 where it is poured into barrels for shipment. The 20% of the mixture that represents impurities and sediments resulting from the cooling process is sold in bulk as a by-product called W for a nominal selling price of $1.00 a pound.

Variation in the length of time in the cooling process or in the temperatures can result in increasing the percentage of by-product to as high as 30% of the Department 3 mixture, but the minimum by-product always will be 20%.

The research division of the company has discovered a prospective use for the by-product in another field, but it would require the setting up of an additional department and an investment of additional capital to handle a further manufacturing process. This new by-product (Clora-W) would sell for $5.00 a pound. To produce this product one-half pound of new material is added to each pound of the sediment obtained from Department 3. However, processing causes a 40% shrinkage of the resulting mixture. Processing Clora-W will add the following additional costs:

Material to be added.............	$ .50 per pound
Variable processing costs..........	1.10 per pound of input
Fixed processing costs............	3,092.00 per month

Required:

Based on the following cost data and production figures for a one-month period, the management requests you to prepare statements showing total manufacturing cost and gross profit for each of the following situations, assuming that all production is sold:

a. By-product W produced at a rate of 20% of Department 3 mixture.

b. By-product Clora-W produced at each of the following percentages of Department 3 mixture: (1) 20%; (2) 30%.

Material issues to Department No. 1:

X 8,000 lbs at $1.00
Y 3,000 lbs at 1.10
Z 1,000 lbs at .70

Processing costs:

Department 1............	$.37 per pound of departmental input
Department 2............	.38 " " " " "
Department 3............	.45 " " " " "
Department 4............	.45 " " " " "

All processing costs in Department 4 may be considered as variable.

(Uniform Certified Public Accountant Examination, May, 1953)

CHAPTER XXIII

Questions

1. What is a break-even chart? What is its purpose?
2. Explain the term "break-even point."
3. What procedures are followed in determining the break-even point for a business?
4. What is the period of time covered by the cost and income chart? How is this period determined?
5. Name four bases for "plant capacity" as the term is used in connection with cost and income charts.
6. What does the horizontal scale on the graph represent? the vertical scale?
7. How is the revenue line on the chart plotted?
8. How are fixed costs represented on the chart?
9. How are variable costs represented on the chart?
10. What are some of the possible variations in chart construction that may be employed when presenting cost and income data to management?
11. How can the break-even chart be used to present the "contribution margin" approach in making cost analyses?
12. What are some of the factors that cause the break-even point to change?
13. Why is it sometimes said that the break-even point is never "fixed?"
14. What are some of the advantages in the use of cost and income charts? What are the limitations in the use of these charts?
15. How can the use of cost and income charts be justified when there are admittedly certain inherent inaccuracies built into the charts?

Problem 1

The Feist Manufacturing Co. produces a standard automobile part which it sells to seven automobile and truck manufacturers at a fixed price of 80¢ per unit. The company's budgets, based on the natural business year, contain the following totals for the year ending June 30:

Production capacity based on estimated sales, 750,000 units.
Total fixed costs based on estimated capacity, $60,000.
Total variable costs based on estimated capacity, $400,000.

Prepare a simple break-even chart showing the break-even point of operations.

Problem 2

The operating statements of the Malone Co. contain the following results of operation for the month of May:

Net sales	$40,000
Fixed costs	20,000
Variable costs	24,000

Determine how much the dollar volume of sales must be increased in order for the company to break even, using a break-even chart to illustrate your analysis.

Problem 3

The operating statements of the Carter Sales Co. exhibit the following results for the month of June:

Net sales		$100,000
Less: Cost of goods sold		60,000
Gross profit		$ 40,000
Distribution costs	$20,000	
Administrative costs	10,000	30,000
Net profit		$ 10,000

	Fixed	Variable
Cost of goods sold	$20,000	$40,000
Distribution costs	15,000	5,000
Administrative costs	10,000	None

a. Prepare a detailed break-even chart showing variable costs first above the base line, followed by fixed costs and profit.

b. What was the company's break-even point for June?

Problem 4

The Case Co. manufactures a complete line of leather luggage and carrying cases comprising 22 items. Operating statements for the year ending Dec. 31 contain the following totals: sales, $1,200,000; total fixed costs, $300,000; and total variable costs, $800,000. The sales department estimates that it can increase sales to $1,700,000 for the ensuing year. In order to produce the additional units it will be necessary to install additional modern equipment, which will increase fixed costs 20% but will result in a decrease of 10% in variable costs over the preceding year.

Determine whether or not the company should invest in the additional equipment and expand its operations, using a break-even chart to demonstrate your conclusions.

Problem 5

Mitchess Products, Inc. manufactures two standard patented parts which are sold to pump manufacturers. The following totals are extracted from the budget for the year ending Dec. 31:

	Part A	Part B
Selling price per unit	$5	$12
Estimated production, units	27,000	16,000
Estimated fixed costs	$8,000	$34,000
Estimated variable costs	$65,000	$100,000

a. Prepare a separate break-even chart for each line and determine the break-even point in terms of units of production.

b. Prepare a break-even chart for the company's total forecasted operations and determine the break-even point using dollar volume.

c. If Part A is discontinued at the beginning of the budget year, how many units of Part B must be produced and sold to earn the same profit as determined in *b*, assuming that the total fixed costs are absorbed by the production of Part B?

d. Assuming that the number of units determined in *c* can be sold during the budget year, would you recommend that production of Part A be continued?

Problem 6

The budgets of the Gregg Co. contain the following estimates for the 3-month period ending June 30:

	Territory A	Territory B	Territory C
Net sales	$80,000	$120,000	$200,000
Variable selling costs	20,000	40,000	50,000

Cost of goods sold, a variable item, represents 60% of net sales.
Fixed service department costs are as follows:

General sales office	$15,000
Advertising department	9,000
Credit department	5,000
Claims department	6,000

Prepare three break-even charts showing the estimated amount that each territory is contributing to the fixed costs and profit for the company. Show variable costs first above the base line and shade the area indicating the contribution to fixed costs and net profit.

Problem 7

The Rumsey Co., after a survey of the market, estimates that it can sell 600,000 patented note-paper binders during the next budget year. The binders will produce net sales of $633,000. The budgets prepared for the sales of the 600,000 units exhibit the following estimates of costs:

Fixed costs:	
Manufacturing:	
Executive salaries	$ 55,000
Rent	90,000
Depreciation of machinery	30,000
Insurance	10,000
Taxes	15,000
Supervisory salaries	25,000
Light and heat	5,000
Total manufacturing costs	$230,000
Distribution:	
Executive salaries	$ 65,000
Office costs	55,000
Insurance and taxes	1,000
Total distribution costs	$121,000
Administration:	
Executive salaries	$ 45,000
Office costs	40,000
Clerical salaries	4,000
Insurance and taxes	1,000
Total administrative costs	$ 90,000
Total fixed costs	$441,000

Variable costs:	
Manufacturing:	
Materials	$ 33,000
Labor	54,000
Repairs	2,000
Power	1,000
Total manufacturing costs	$ 90,000
Distribution:	
Sales commissions	$ 23,000
Travel	4,000
Total distribution costs	$ 27,000
Total variable costs	$117,000
Total costs	$558,000
Number of units produced	600,000

Income taxes on the first $25,000 of net profits are 30% and on income in excess of $25,000, 52%.

a. Prepare a detailed break-even chart showing fixed cost first above the base line. Show by shaded areas the manufacturing, distribution, and administrative elements of fixed cost and the manufacturing and distribution elements of the variable costs. Show on the chart by means of shaded areas the portion of projected profit to be allocated for income taxes and that portion available for dividends and retained earnings.

b. What is the company's break-even point?

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